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Occupational Health Hazards of Women Construction Workers: A Critical Survey of the Literature

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Abstract

This paper surveys and critically reviews of the major research works on occupational health hazards of women construction workers in non-farm sector. These papers analyze how various hazards affect the women workers in construction industry. The studies cover major hazards like mechanical, chemical, mental, biological and physical ones, in the field of community medicine, environmental studies, psychological, sociological and general medicine point of view. Only a few studies have been done to incorporate the ideologies of occupational health hazards within an economic point of view. This research gap opens a new avenue of research for the study on an economic analysis of occupational health hazards in the construction industry.

Keywords: women construction workers, construction industry, occupational health hazards,

Introduction

Modernization and industrialization have paved a good path to the construction industry. There are more than 20 million construction workers in India at present. The construction sector is one of the largest employers of women next to agriculture in India. Construction work is often described as a dirty, difficult and dangerous job. It is one of the most hazardous and accident-prone activities as reported by International Labour Organization (ILO). Construction sectors involves work that are highly unsafe like working in extreme heights, welding, cutting, centering, carrying stuff to high places without the use of any kind of technology. Globally, 17% of all work-related fatalities are in the construction sector (ILO). So far as women construction workers are concerned their conditions are even worse. Women construction workers may carry single loads of up to 51 kg, far more than the weight limit recommended by occupation safety and health standards for women. They also tend to carry heavier loads when they have to climb up a job site and a repetition of this kind of work takes a toll on the women, and their bodies.

Occupational Health Problems

However, majority of workers and citizens are still facing serious occupational health problems including general health problems like high mortality rates, birth control and gender imbalance, violence, accidents, communicable and non-communicable diseases, malnutrition, poor environs, lack of clean potable water, insufficient nutrition, poor sanitation and inadequate medical care. Globalization and rapid industrial growth (about 8% annual economic growth) in the past few years have further intensified the problems and complexities of occupational health related issues.

Construction workers are characterized by insecurity of wages, dangerous working conditions and lack of access to any kind of health care. According to a recent survey by the International Labour Organization, 165 out of every 1000 workers are injured during work. The living conditions are in no way better than the working conditions. They live in temporary shelters built on the construction site, in tents built out of rubber and metal sheets. Most of the time, the construction companies do not provide any electricity, or even proper sanitation. There are only few studies which have focused on the occupational health hazards in an economic point of view and treatment needs among the construction workers.

Focus of This Paper: Occupational Health Hazards in Construction Industry

In this context, the present paper surveyed and reviewed the major research works on occupational health hazards in construction industry and tries to identify the important research gap for scope for further research in the discipline of occupational health hazards of the construction industry.

The major works of the health hazards are listed below:

Author(s) – Objective and Methodology of health hazards, measured hazards - Major Findings

Author(s)	Title	Objective	Methodology	Major Findings
Andrea Tyree et al. (1974)	The Occupational and Marital Mobility of Women.	The occupational mobility of women is found to be less similar to mobility patterns of men than is women's marital mobility.	The NORC data on occupational mobility of women presented.	Thus, similar patterns govern movement of both men and women from their origins to the status of male head of their families.
Cook.W.K (1979)	Integrating research and action: a systematic review of community-based participatory research to address health disparities in environmental and occupational health in the USA.	1.To examine the extent to which CBPR integrates action to effect community-level change and 2. To ascertain factors that facilitates such integration.	Occupational health hazards in the USA were identified primarily through a Medline search.	Community-initiated and action-oriented observational studies might be needed.
Kittyc Alavita. (1983)	The Demise of The Occupational Safety and Health Administration: A Case Studying Symbolic Action.	The Occupational Safety and Health Administration, Supposedly designed to protect U.S. workers on the job, was seen by many as no more than a symbolic gesture to labor when it was created in 1971.	OSHA had little immediate impact on working conditions, but it did provide a vehicle for incremental gains by labor, both material and ideological.	The advances made by labor under OSHA argue that attacks on the agency by the Reagan administration are an attempt to revoke those gains and erase the concessionary message of the 1970s.
Jorma Rantanen. (1983)	Occupational health and safety in Finland.	At present the Finnish occupational health and safety legislation meets the Scandinavian standard well, though the structure of the Finnish legislation is more fragmented.	The organization and manpower resources of occupational health and safety comprise more than 100,000 persons (5 °/o of the labor force), and the number of full-time experts is about 3,600.	Three major national programs (National Occupational Health and Safety Program, National Occupational Health Service Program and National Program for Science Policy) were established so that the needs of occupational health and safety could be met.

Andrew Szasz, (1984)	Industrial Resistance To Occupational Safety and Health Legislation: 1971-1981.	This paper explores the role played by industry in the evolution of one of these new regulations, the Occupational Safety and Health Administration.	Federal government intervention in the U.S. economy dramatically increased in 1970 with the creation of a series of "social" regulations to protect the public from the unintended health consequences of industrial production.	The industry initially reacted defensively and developed containment strategies to minimize the impact of the new agency. They took the initiative in mid-decade, when growing economic malaise altered the political and ideological climate in their favor.
Eve Roman. (1985)	Occupational mortality among women in England and Wales.	Occupational mortality in women who died in England and Wales from 1970 to 1972 was analyses.	Parity is a determinant of patterns of disease in working women, and the relative excess of cancer of the breast, ovary, and uterine; the body of professional and clerical workers probably reflected the high proportion of nulliparous women in these groups.	As women now constitute 40% of the workforce, often have their own specific occupations, and possibly also have their own diseases related to, specific occupations it is time for the registrar's guidelines on the recording of women's occupation.
Gary M Shaw. (1988)	Methodological considerations in the study of parental occupational exposures and congenital malformations in offspring.	The existence of hazardous substances in the workplace has raised concerns about the potential of these substances for adverse reproductive effects.	Methodological considerations inherent in studying the potential relation between parental occupational exposures and congenital malformations in the offspring.	With regard to measuring exposures, issues include methods for obtaining valid estimates of the nature, duration, timing of exposure, and exposure-response relationship. Other methodological is- sues discussed include selection of appropriate reference groups, sample size, and multiple hypothesis testing.
Nancy Frank. (1993)	Maiming and Killing: Occupational Health Crimes.	This article explores the issues of uncertainty, acceptable risk, and enforcement.	Because of technical, economic, and political dilemmas, workers bear the	Since society benefits by permitting workers to be exposed to occupational health hazards, it has a

			burdens of occupational disease.	responsibility to compensate those who become ill and to provide an integrated system of legal controls to protect workers.
Francoise Barten. (1996)	The Occupational Health Needs Of Workers: The Need for a New International Approach	U.N. Universal Declaration of Human Rights declares, all people have a right to the highest level of health attainable, and then surely the health of those who produce all valued products used by society is of basic concern.	The effects of the health hazards they face are often added to those of poor living environments, poor nutrition, and unsatisfactory housing.	This is particularly true for developing countries where, for the majority of workers, survival depends on work undertaken in exploitative conditions, with low incomes and unhealthy working conditions.
Dana Loomis, et al. (1997)	Informal Jobs: Another Occupational Hazard of Women's Mental Health?	The analysis that informal jobs, which imply absence of formal labour contracts, instability and the absence of fringe benefits, are positively associated with psychiatric symptoms was evaluated in a poor urban area of Brazil.	The study population was composed of 327 women randomly selected from a community in the city of Salvador, Brazil. Women who reported having a job without a formal contract were classified as informal workers.	A positive association between informal work and a high number of psychological symptoms was found (crude prevalence ratio=1.88, 95% confidence interval [Cl]:1.24-2.85).
Timo J Partanen. (1999)	Collaboration between developing and developed countries and between developing countries in occupational health research and surveillance.	Occupational health and safety is encouraged in the development of infrastructure in research empowerment and capacity building.	identification and documentation of problems, sponsorship, databases and surveillance systems, technical support, methodology, publishing, research and training programs, controlled intervention, information exchange.	The sustainability of occupational health and safety structures and functions in the developing countries is a primary concern. Socio-ethical principles emphasize local, national, mutual and global gains.

Donna Mergler. (1999)	Combining quantitative and qualitative approaches in occupational health for a better understanding of the impact of work-related disorders.	These changes have important repercussions on the nature and type of occupational exposures, as well as on the labor force, affecting the relation between work and health.	While quantitative studies have dominated occupational health research over the past half century, qualitative methods can serve to ground quantitative data with regard to defining the research questions.	Work conditions on health and well-being, and reducing errors in exposure and health outcomes. Combining qualitative and quantitative methods in a complementary fashion can lead to a better understanding of the rapidly changing work environment and labor situation and a means for developing appropriate strategies for preventive intervention.
Laura. S, (2000)	Women in Construction: Occupational Health and Working Conditions	More women have taken jobs in the construction industry over the last two decades, as they have in other nontraditional industries.	In 1997, there were 8.1 million construction workers, of whom 781,000 (9%) were women. Approximately 2% of those were employed as skilled tradeswomen.	Women have a different pattern of fatal injuries and some differences in patterns of nonfatal injuries than men and report unique problems and concerns related to working in this industry.
Joan Benach. (2002)	A new occupational health agenda for a new work environment.	The emergences of new forms of work organization are transforming what had become standard types of work arrangements in industrialized countries.	The emergence of new forms of work organizations, are transforming what had become standard types of work arrangements in industrialized countries.	An alternative is also proposed for dealing with the conditions and settings needed to meet the new challenges related to establishing an effective occupational health policy.
Jos H Verbeek, et al. (2002)	Evidence-based medicine for occupational health	This study attempted to determine the feasibility and utility of methods used in evidence-based medicine for some common questions in the practice of occupational medicine.	Occupational medicine is the medical specialty concerned with the promotion and maintenance of the physical and mental health of employees in occupational settings. This work is related to two fundamental problems	Evidence-based medicine is a feasible and useful method for occupational medicine. Instruction and training is needed for most occupational health physicians to increase their searching and critical appraisal skills.

			that are the subject of occupational medicine, work causing occupational diseases or work-related disorders and health problems leading to the impairment of work ability.	
Ameille. G,et al. (2003)	Reported incidence of occupational asthma in France, 1996-99: the ONAP programme.	To estimate the general and specific incidence of occupational asthma in France in 1996-99; and to describe the distribution of cases by age, sex, suspected causal agents, and occupation.	New cases of occupational asthma were collected by a national surveillance programme, based on voluntary reporting, named Observatories National des Asthmas Professionals (ONAP), involving a network of occupational and chest physicians.	Despite likely underreporting, the number of cases of occupational asthma reported to the ONAP was approximately twice the number of compensated cases over the same period. The relevance of the programme is confirmed by the reproducibility of the results year after year, and its consistency with other surveillance programmes. The ONAP programme is useful for the identification of targets for primary prevention.
Jos Verbeek. (2004)	Building an evidence base for occupational health interventions	This article summarizes arguments for building an evidence base for occupational health.	Current reviewing methods can be adapted to the special features of occupational health.	Reviews in order to create a necessary evidence base for occupational health interventions. Occupational health could benefit considerably from greater awareness of the evidence for and against various types of intervention
Thoreia Mohamed Mahmoud, et al. (2004)	A Study of Occupational Health Hazards Among Assist Spinning Factory Workers	To assess the work site for hazards and potential hazards and reducing risk that could lead to disaster situation.	1. This study was conducted in Assist Spinning Factory. 2. There are about 1000 workers and employees. 3. Out of 100 workers were 550 were women.	The majority of workers (94.4%) were married. 50.9% of workers can read and write and 25.6% had basic education.

Paul Leigh.J. (2004)	Occupational Disease and Workers' Compensation: Coverage, Costs, and Consequences.	Most of the costs of occupational disease are not covered by workers' compensation.	Estimated the number of workers' compensation cases, costs, and deaths for 1999, using data from up to 16 states representing all regions of the country.	The deaths and costs represented substantial cost shifting from workers' compensation systems to individual workers, their families, private medical insurance, and taxpayers (through Medicare and Medicaid).
Ram Lakhani,.(2004)	Occupational Health of Women Construction Workers in the Unorganized Sector	To assess the occupational health status of women workers in the construction industry.	One thousand and fifty-two workers were selected by stratified random sampling, medically examined and subject to relevant interviews, examinations and investigations.	Discriminatory barriers to financial and career advancement were found to be linked to recurrent physical and psychological symptoms and more frequent visits to the doctor among women workers.
Henk F van der Molen, et al. (2005)	Conceptual framework for the implementation of interventions in the construction industry	The objective of this study was to explore the necessary steps to define the implementation of interventions aimed at reducing physical work demands due to manual materials handling in the construction industry.	A theoretical structured framework of six steps is outlined as a method for developing the implementation of interventions. In this framework, both the proposal for implementing the intervention measures and the context analysis are conditional.	The framework was found appropriate for defining implementation strategies and (ergonomic) measures in the construction industry.
Alex Burdorf, et al. (2005)	Development of a decision model to identify workers at risk of long-term disability in the construction industry	This study presents a decision model that predicts long-term disability among construction workers.	Logistic regression model to calculate the probability of long-term disability in the next 4 years for a particular construction worker.	The decision model Evaluation studies will need to demonstrate whether the application of this decision model is helpful in identifying workers.

Pirm AJ Luijsterburg, et al. (2005)	A new bricklayers' method for use in the construction industry	The aim of this study was to investigate the effect of raised bricklaying on physical workload, reported musculoskeletal disorders, sickness absence, and job satisfaction	A controlled intervention study with a follow-up period of 10 months was performed among 202 bricklayers from 25 construction companies	Controlled intervention studies on ergonomic improvements are rare. This study shows that the introduction of an ergonomic improvement in the construction industry may reduce physical load and the incidence of sickness absence.
Ram Lakhani. (2005)	Occupational Health of Women Construction Workers in the Un-organized Sector	This study was undertaken to assess the occupational health status of women workers in the construction industry by evaluating incidences of occupational health disorders.	A total of1, 052 workers selected by stratified random sampling were medically examined and subjected to relevant interviews, examinations and investigations.	Women reported earnings of Rs. 38 to 40 per day. Only 5 per cent of women and 2 per cent of men have permanent employment. Seventy-seven per cent of the women and 96 per cent of the men reported working for 10 to 12 hours daily.
Xiuwen Dong. (2005)	Long work hours, work scheduling and work-related injuries among construction workers in the United States	1. To establish whether there is any connection between work hours and safety outcomes among construction workers	The National Longitudinal Survey of Youth, 1979 cohort (NLSY79), was used for the data analysis. Odds ratios were used to measure the risk of work-related injury in different worker groups.	The results provide evidence that overtime and irregular work scheduling have an adverse effect on worker safety.
Lynda S,et al. (2006)	The effectiveness of occupational health and safety management system interventions: A systematic review	This systematic literature review aimed to synthesize the best available evidence on the effects of OHSMS interventions on employee health and safety and associated economic outcomes.	Twenty-three articles met the study's relevance criteria. Thirteen of these met the methodological quality criteria. Only one of these 13 original studies was judged to be of high methodological quality; the remainder had moderate limitations.	There were some null findings but no negative findings. In spite of these promising results, the review concluded that the body of evidence was insufficient to make recommendations either in favour of or against OHSMSs.
Jo-Anne Fiske.	Aboriginal citizen, discredited medical subject:	Paradoxes and contradictions in Canadian health policy discourses that	Drawing on critical discourse theory, we analyze health	Intertwined with explicit resistance to Aboriginal entitlements,

(2006)	Paradoxical constructions of Aboriginal women's subjectivity in Canadian health care policies.	define Aboriginal women as empowered citizens on the one hand and as discredited medical subjects on the other.	policy discourses within the contexts of related political and public discourses about Aboriginal peoples in Canada.	deconstruction of health policy discourses within this political context is central to understanding how Aboriginal women continue to be discredited through processes of marginalization.
Bill Buenar Puplampu, et al. (2007)	Key Issues on Occupational Health and Safety Practices in Ghana: A Review.	To know the unearthing key issues on occupational health and safety practices in Ghana.	These secondary data were based principally on desk analysis of literature available on the internet (e.g. EMERALD; PUBMED; EBSCO etc.).	That Ghana must have a renewed attention to occupational health and safety practices especially occupational health and safety research and occupational health and safety promotion.
Catherine Thomsen. (2007)	Indicators for Occupational Health Surveillance	Each year millions of the estimated 140 million U.S. workers are injured on the job or become ill from exposure to hazards at work.	In 1998, the Council of State and Territorial Epidemiologists (CS TE) and CDC s National Institute for Occupational Safety and Health (NI OSH) convened a workgroup that identified priority occupational health conditions to be placed under surveillance, addressed cross-cutting surveillance concerns.	In 2005 y CSTE released a report compiling OHI data from 13 states. NIOSH provides funding for the OHIs because they are now a required component of state-based cooperative agreements for occupational health surveillance.
Sang D. Choi, (2007)	Occupational Ergonomic Issues in Highway Construction Surveyed in Wisconsin, United States	In order to achieve the study objectives, a survey was designed and sent to Wisconsin based construction contractors.	To design an adequate questionnaire, the research team first conducted a pilot study.	The findings from this study may assist Safety and health professionals in the construction industry in making effective changes for improving health and productivity.
Johanna Beswick, et al. (2007)	An analysis of the prevalence and distribution of stress in the construction industry	To identify the key causal factors of work-related stress	The primary tool used to gather data was a questionnaire. In order for an accurate estimate to be made	To consider potential interventions for work-related stress for the construction industry, stakeholder opinions on this issue were sought

			regarding the prevalence of stress, it is important that a good response rate is achieved to the survey.	and informed.
Jinky Leilanie Lu, (2008)	Occupational Hazards and Illnesses of Filipino Women Workers in Export Processing Zones	This study identified and established associations between work-related hazards and illnesses among women workers.	The respondents were taken randomly from each stratum per size and type of the company and each was given a questionnaire to fill out.	Physical, chemical, and ergonomic hazards were evaluated and measured through workplace ambient monitoring, survey questionnaires, and interviews with 500 respondents in 24 companies (most were female at 88.8%).
Taimela.S, (2008)	The effectiveness of two occupational health intervention programmes in reducing sickness absence among employees at risk. Two randomized controlled trials	To evaluate the effectiveness of two occupational health intervention programmes, both compared with usual care.	Among the intermediate risk employees those in the intervention group (n = 268) were invited to call a phone advice centre. In both trials the control group received usual occupational health care. The primary outcome was sickness absence during a 1 2- month follow-up (register data).	The occupational health intervention was effective in controlling work loss to a degree that is likely to be economically advantageous within the high risk group.
Annette Barnabas, (2009)	A Study on the Empowerment of Women Construction Workers as Masons in Tamil Nadu, India	To determine the process by which men are being trained in construction sector, to determine the willingness of women construction workers to become masons and the willingness of men construction workers and contractors to train and employ women as masons..	A study was conducted on the career progress of 440 men construction workers and 440 women construction workers and 51 building contractors to find out the reasons why women in the construction sector.	The findings of the study show that there is an inherent gender bias against women and also the shared general belief that women construction workers are unfit to be trained informally like men in the construction sector.
liu.J, et al, (2009)	The Relationship between Chinese Construction	Explored the relationship between human immunodeficiency virus/	A cross-sectional study was conducted among 428 male	HIV/AIDS-related nowledge could improve the attitude and behavior of

	Workers' HIV/AIDS-related Knowledge, Attitudes and Behaviour: a Structural Equation Model	acquired immune deficiency syndrome (HIV/AIDS)-related knowledge, attitudes and behavior in migrant urban construction workers.	subjects on three building sites in Shenyang City.	migrant urban construction workers, enabling them to avoid high-risk behavior that increases the spread of HIV/AIDS. Any intervention used will need to take the important factor of age into consideration.
Lloyd W. Klein, **(**2009)	Occupational Health Hazards in the Interventional Laboratory: Time for a Safer Environment	It reviews available data on the prevalence of occupational health risks.	Interventional laboratory poses workplace hazards.	Interventional physicians and their professional Societies, working together with industry, should strive toward minimizing operator radiation exposure.
Jenny Fortune (2010)	I Am The Mother and The Father' - Women in Construction in Cuba and The UK	The aim of this article is to evaluate the progress made by women in Cuba in making inroads into this male-dominated work sector, building on theoretical perspectives in relation to working	Drawing on interviews with Cuban women in construction, it seeks to find answers to the questions of why women should choose to go to work in this environment despite the barriers, whether there are good reasons for society needing them to do this kind of work and what conditions need to be put in place in order to make this possible.	These questions are evaluated in relation to the triple burden of paid work, combating exclusion, and unpaid work in the home; and conclusions are drawn for future study.
Kartik R Shah, et al, (2010)	Occupational skin problems in construction workers	The present study has been carried out among unorganized construction workers to find the prevalence of skin problems.	The present cross-sectional study was conducted in 92 construction workers of Ahmadabad and Vadodara.	The age group of 20-25 years, males, those having ≥1 year exposure and those working for longer hours. Half of the workers not using personal protective equipment had reported skin-related symptoms.

Dietmar Elsle, (2010)	Factors influencing the transferability of occupational safety and health economic incentive schemes between different countries	To looks at the factors that influence the transferability of different types of occupational safety and health (OSH)	The European Union (EU), the European Agency for Safety and Health at Work (EU-OSHA) surveyed EU member states about the state of such schemes in their countries.	In competitive insurance markets, effort-based incentives are more difficult to achieve.
Kimi Uegaki, et al, (2010)	Economic evaluations of occupational health interventions from a corporate perspective – a systematic review of methodological quality	Economic evaluations of occupational safety and health (OSH) interventions conducted from a corporate perspective quality criteria list.	Using a standardized quality criteria list, we appraised the methodological quality of economic evaluations of occupational safety and health (OSH) interventions conducted from a corporate perspective.	The quality of future evaluations needs to be improved to increase the validity of their conclusions and recommendations
Poongodi. R, et al, (2010)	Economics of women construction workers with special reference to Thuraiyur Taluk, Trichirappalli district in Tamilnadu	1. To study the working conditions of women construction workers. 2. To study about the wage structure of women construction workers.	Primary data for the study were collected from a random sample of 250 women construction workers in Thuraiyur Taluk of Tiruchirapalli District in Tamil Nadu.	Most of them are occupied in low category of work, where there is wage discrimination, male domination and many more economic and social problems.
Shain. M, (2010)	Workplace Addiction and Mental Health In The Construction Industry: Literature Review	The purpose of this literature review was to determine the current state of research as it relates to workplace addiction and mental health in the construction industry. The objectives of this.	A search of the medical and business literature was conducted in November 2008 and was updated in January 2010 using the databases	The literature covered several aspects of addiction and mental health in the construction industry.
Kazys Algirdas Kaminskas, (2010)	A Cross-Sectional Survey of Construction Workers: An Ergonomic Approach	Construction employees, from a twelve Lithuanian small and medium companies of construction industry, were randomly selected and invited to complete a survey on different	1. The questionnaire included questions about stratification of the sample. 2. Construction employees, from a twelve Lithuanian	The strategy in construction suggests that ergonomics be integrated into apprenticeship and vocational schools training programs. Training of workers is

		discomfort of the body parts.	small and medium companies of construction industry, were randomly selected and invited to complete a survey on different discomfort of the body parts.	necessary but not sufficient to insure ergonomic change.
Kwesi Amponsah, et al, (2010)	Occupational Health and Safety: Key Issues and Concerns in Ghana	This paper examines occupational health and safety (OHS) issues in Ghana and reveals the lack of a comprehensive	According to the World Health Organization (WHO) poor occupational health and reduced working capacity of workers may cause economic loss up to 10-20% of the Gross National Product of a country.	It is argued that poor countries and companies cannot afford safety and health measures.
Hafiz .0, (2010)	Knowledge And Practices Related To Occupational Hazards Among Cement Workers In United Arab Emirates.	To assess the knowledge and practice of workers in cement factory in Ras Al- Khaimah, UAE on the occupational hazards of their work.	A cross-sectional study involving 153 cement factory workers	Despite the relatively high knowledge of the cement factory workers about the adverse health effects of exposure to dust, the use of respiratory protective equipment was poor.
Kazys Algirdas Kaminskas , (2010)	A Cross-Sectional Survey of Construction Workers: An Ergonomic Approach	Twelve Lithuanian small and medium companies of construction industry were randomly selected.	Our research aimed to identify ergonomic risks encountered by trades on sites of small and medium construction companies, to develop interventions to reduce those risks.	Training of workers is necessary but not sufficient to insure ergonomic change.
Mason.A, (2010)	Building and Construction Workers	The objective of the study is to document livelihoods practices of urban poor in building & construction industry.	The primary research involves personal interviews and field visits with different stakeholders in supply chain(s) of building and construction industry.	At the end, an analysis of the problems faced by urban poor is made. This section gives a clue to designing of possible policy level interventions to enhance poor people's livelihoods.

Jinky Leilanie Lu, (2011)	Occupational Health and Safety of Women Workers: Viewed in the Light of Labor Regulations	This article is an analytic and discursive review of data and studies about women workers in the manufacturing sector in the Philippines in the light of labor regulations.	The topics included- occupational health and safety, health and safety programs, provision of facilities at work, and labour issues pertaining to women workers. Data were analyzed using qualitative method and meta- sociological analyses.	Advocacy and policy framework for women's work should not only be directed locally and nationally, but must wield influences at the global level, since the processes inside the work organization are just a reflection of the wider and broader realities occurring in the global arena
Chockaling am.S, (2011)	An Effective Total Construction Safety Management In India	In this paper, several construction safety techniques were used for the safety of major construction organizations across India.	Construction safety management has always been a big issue in India. Though much Improvement in construction safety has been achieved, India still continues to lag behind most other countries with regard to safety.	A measure of safety management could be used to identify those areas of safety that need more attention and improvement.
Ajeet Jaiswal, (2011)	A study of the occupational health function among female textile workers	Present study aimed to find the factors associated with the deterioration of respiratory function among female textile workers.	The sample consisted of 243 men above the age of 20 years who had worked for at least 3 months years in a textile factory and 235 female non textile workers of same area were studied.	Welfare measures by textile industrial authorities should be strengthened for better sanitary measures and safe drinking water, better housing, adequate food supply, medical care and for overall improvement of socio-economic conditions.
Niraj Pandit, (2011)	A study of maternal and child health issues among migratory construction Workers	The present study was conducted to assess the various aspects of Maternal and child health (MCH) issues among migratory families.	It was a cross sectional study and conducted in the Sumandeep Vidypeeth Campus, Piparia, district Vadodara. There were 52 families working in campus and all were interviewed for study.	The study reflects that the group is more vulnerable and there is need to focus on this group to achieve goals of MCH.

Sri Sakthi Joseph John, et al. (2011)	Periodontal health status and treatment needs among building construction workers in Chennai, India.	To assess the periodontal health status and treatment needs among them.	1. A cross sectional study, involving 321 construction workers using a cluster sampling technique was employed. 2. Pearson's chi square and kruskal Wallis test were used for statistical analysis	Among the study subjects 53.6% required scaling 23.4% required oral hygiene instructions, 18.7% required complex periodontal treatment.
Guddi Tiwary, et al. (2011)	A Review on the occupational health and Social security of unorganized workers in the construction industry.	To bring to light the different health problems among workers working in the building construction industry.	The sizable numbers of the workforce from the unorganized sectors are taken.	The victims of headache, backache, joint pains, skin diseases, lung disorders like silicosis, other muscular skeletal disorders, and so on.
Balkrishna .B, (2011)	Health problems among migrant construction workers: A unique public–private partnership project	To study socio-demographic profile and morbidity pattern of construction workers.	A medical team provided comprehensive on-site health care services, and a Health Card was devised to maintain the record of socio-demographic, occupational details, and complete physical Examination findings of the workers who participated in the study.	The mean age of the workers was 26.25 ± 8.49 years. A third of the migrants belonged to West Bengal. The average number of health problems in the workers was 1.41. Regular consumers of tobacco and alcohol were 50.48 and 14.65%, respectively.
Nithin Prasad.R.S , et al (2011)	Study On Building and Other Construction Workers Welfare Schemes/Amenities In Karnataka	Providing adequate working conditions and welfare amenities, the Government of India enacted the legislation namely, Building and Other Construction Workers (Regulation of employment and conditions of services) Act, 1996.	Thirdly, 189 respondent's data has been collated and analyzed using statistical packages to ascertain the awareness and hurdles of the Scheme. Finally, inferences from the analysis have been validated using Chi- Square test and comparative study.	The outcome of the study shows that 92.5 % out of 14 lakh workers have been deprived of the benefits of the Welfare Scheme promoted by the Building and Other Construction Workers' Welfare Board, Karnataka.

Mohammad Akram, (2012)	Migrant Construction Workers: A Study of Sexual Behavior and Sexual Health Problems.	It is tough to objectively study the sexual behavior of an individual or a community.	The universe of the study is six cities in western Uttar Pradesh. The migrant population is dispersed in all the possible construction sites of the cities.	Health or treatment seeking behavior and especially for problems related to sexual health is very poor.
Humphrey Danso, (2012)	Construction Workers' Satisfaction with Work Provision Requirement Dimensions in Ghana's Construction Industry	The paper contributes to the general body of knowledge in the area of workers' satisfaction in developing countries particularly in Ghana's construction industry.	It involved a cross-sectional survey that used a self-administered structured questionnaire administered to five hundred respondents of building construction workers.	The findings indicate that though workers are satisfied with some work provision requirement dimension items significantly, most of the workers are very dissatisfied with working environment and work benefit of the work provision requirement in Ghana.
Anu Rai, et al, (2012)	Workplace Culture & Status of Women Construction Labourers: A case study in Kolkata, West Bengal	The present study aims at - identifying the major issues related to workplace culture of women construction labourers.	Kolkata, the capital city of West Bengal has been selected as the study area, as the construction industry is growing rapidly.	The major hurdle in issuing such a card is that it requires a birth certificate and documentary proof of age and residence; women workers are mainly uneducated and have neither birth certificate nor school certificates.
Poongodi. R, et al, (2012)	Socio Economic Characteristics of Women Construction Workers in Tamilnadu – Some Evidences	1. To study about the wage structure of women construction workers. 2. To study the problems faced by women construction workers.	Primary data for the study were collected from a random sample of 50 women construction workers in Thuraiyur Taluk of Tiruchirapalli District in TamilNadu, during January to June 2012.	Women workers in construction industry have to assume multiple burdens of household work, looking after children and work in the sites to earn a living.

K. Bharara**,** et al **(**2012)	Issues of Occupational Health and Injuries among Unskilled Female Labourers in Construction Industry: A Scenario of Punjab State	To examine the incidences of work related injuries among female construction workers In Punjab state.	A sample consisting of 80 female workers up to the age of 40 years engaged in construction industry as unskilled labourers was selected from 8 randomly.	1. Primarily the occupation being severely hazardous and women lacking training and required physical endurance for such strenuous job. 2. Accidents at such sights are waiting to happen and it is certainly not an occupation for the fairer sex.
Chawada .BL, et al, (2012)	Plight of female construction workers of Surat city	The present study is aimed to explore problems of female workers at construction sites in working environment.	This was a Cross sectional study conducted in May 2011in which all females working at the sites were randomly selected.	Lack of social security and family support make them a vulnerable group for addiction and violence. Alternate way for providing healthcare for these women should be sorted out early.
Kamala Kanta Mohapatra, (2012)	Women Workers in Informal Sector in India: Understanding the Occupational Vulnerability	More than 90 per cent of workforce and about 50 per cent of the national product are accounted for by the informal economy.	In sub-Saharan Africa 84 per cent of women non-agricultural workers; in Latin America 58 per cent for women in comparison to 48 percent for men.	Many of these women workers are primary earners for their families. Their earnings are necessary for sheer survival.
Srinivasan. S, et al, (2012)	A Study on the Problems of Migrant Women Workers in Thuvakudi, Trichy District	The specific objectives of the study are to identify the occupational, economic status, child care services available, health problems	The research design used for this study is descriptive.	The findings of the study by the researcher will pave a way for Gramodaya (NGO) to work for the betterment of the women migrant workers at Thuvakudi in Trichy district.
S.Tikoo, et al. (2013)	Work Place Environmental Parameters and Occupational Health Problems in Women Construction Workers in India	To assess the impact of work place environmental parameters on women construction workers.	1. A multistage purposive sampling design was followed to select the study area, construction sites and women construction workers. 2. Only a total sample of 600 women construction workers was selected (150 from each	1. A significant association was found between frequency of occupational health problems and extent of suitability of work place environmental parameters of different districts. 2. A significant negative correlation existed between frequency of

			district). The data were collected with the help of pre-tested interview schedule.	occurrence of occupational health problems and extent of suitability of environmental parameters.
Peter O. Kalejaiye, (2013)	Occupational health and safety: Issues, challenges and compensation in Nigeria	Industrialization and mechanization are increasing while occupational health problems.	This paper provided evidence through the content analysis of literature reviewed that, the illness from such hazards affect a considerable number of workers in Nigeria. It also examined the nature of compensation given to injured, sick or diseased workers in the cause of performing their duties in Nigeria.	Safety measures should be provided for workers against health hazard, while injured, sick or diseased workers.
Srinivasan S. (2013)	Occupational Health Problems of Women Migrant Workers in Thogamalai, Karur District, Tamil Nadu, India	To identify the occupational health problems and exploitation faced by the women migrant workers and the expectations of the migrant women workers.	The sampling strategy used is simple random through lottery method. Data was collected from 100 respondents.	Majority of the respondents say that the problems of lighting, radiation, renal, liver and occupational cancers are less due to work.
Dileep Kumar M (2013)	Inimitable Issues of Construction Workers: Case Study	This is because employment intensity is much higher in lower income countries than in higher income ones.	A study was conducted in Pune city of Maharashtra during 2010-2011 periods.	The findings of the case study and the survey questionnaire exactly showed replicated viz., exposed the deplorable condition of workers in the construction industry.
Ravi Kumar.B, (2013)	Gender Discrimination among Construction Workers With Reference To Vijayawada	To determine the factors that influences the awareness of construction workers of gender discrimination among construction workers.	This is a descriptive study as the problems and gender discrimination faced by Women construction workers in Vijayawada.	The findings also show that women construction workers are competent enough to be trained to become masons and they could be first formally trained and then informally trained to become masons in the construction Industry in India.

Krishnamurthy.V, (2013)	The Welfare Fund for Construction Workers in Tamil Nadu	An assessment of the economic impact of the welfare schemes implemented by the Board.	Chennai City 74 per cent of workers has registered with the welfare fund. This is the main justification for the selection of Chennai City for the micro-level study.	The construction workers, their economic status, employment and income characteristics, the expenditure patterns of labour households and the benefits extended by the Welfare Board.
G. Tiwary, (2013)	Psychosocial stress of the building construction workers	To assess the psychosocial stress and strain faced by the workers due to exposure to work.	This is a cross sectional prospective study. Different employment units/groups located in & around north-east part of Kolkata were selected by stratified random sampling technique.	The workers were suffering from job stress & strain. Low wages, job insecurity, repetitive work and bullying by superiors were some of the causes of occupational stress & strain.
Srinivasan. S, et al, (2013)	Occupational Health Problems Faced By Female Beedi Workers at Khajamalai, Trichy District, Tamil Nadu	The research selected 50 families for the study using a purposive.	The researcher used a descriptive design. The sample for the study comprised of female Beedi workers. The size of the sample was 50 female Beedi workers.	Therefore, social activities need to take up the cause of Beedi workers and fight for their Rights.
Srinivasan. S, (2013)	Work Problems Faced by Aged Construction Workers in Thanjavur District, Tamil Nadu	1. To assess the occupation health of the respondents. 2. To study the health problems of the respondents.	The researcher carried out descriptive research design. The total number of sampling size 70. The present descriptive study on occupational health problem faced by aged women construction workers. The size of the universe is 140	Most old age people are going for construction work. Production should be given to the construction work. It the work extra time over time salary should be given.

Mesafint Molla Adane, et al, (2013)	Occupational Injuries Among Building Construction Workers in Gondar City, Ethiopia	The study revealed that occupational injuries were common among building construction workers.	A total of 401 building construction workers were included in the study by using simple random sampling technique.	Therefore, counter measures such as creating awareness of risk factors, avoiding overtime work, providing training and personal protective devices could be effective to decrease prevalence of occupational injuries.
Venmathi. A, et al, (2013)	Creating Awareness on Occupational Health and Safety among Workers Employed in Garment Industries	Highlight them on the legal protection to labour	The investigator completed survey among workers in selected 13 large, medium and small scale garment industries and found that the workers were employed in unsafe and unhealthy work environment and therefore unaware of the importance of occupational health and safety and ergonomics in the workplace.	However, it is very important that the knowledge and experience acquired by the workers who took part in the awareness programme should be disseminated among other employees of the industry.
Hood Thabit, et al, (2013)	Prevalence and predictors of diabetes and cardio metabolic risk among construction workers in Ireland: The Construction Workers Health Trust screening study	Construction workers (CW) are at increased risk for a range of chronic diseases. We screened 983 CW for diabetes and cardio-metabolic risk. The age range was 18–64 years, with mean age of 36.3 years.	Self-reported questionnaires, Finnish diabetes risk score and fasting blood tests were collected at the workplace.	The majority were either overweight (48.3%) or obese (21.8%). In a regression model, age remained the strongest predictor of fasting glucose ($p < 0.001$).
Kalpana devi, et al, (2013)	Status of Female Workers in Construction Industry in India: A Review	Construction industry provides job opportunity to a large number of skilled as well as unskilled work-force.	The present study is a review of past research work related to the women work force employed in construction industry in India.	Sexual harassment, gender biasness, wage discrimination are the major factors due to which the working environment becomes difficult for them in the industry and women's wages remain at the same level of skill even after working a few

				number of years.
Anandi Bagchi, et al, (2014)	Occupational & Ergonomic Health Analyses of Female Construction Workers of West Bengal, India.	To bring to light the different health problems amongst the workers working in the Brick Kiln correlated with building construction industry.	The study was a community based double blind cross sectional study, conducted on female brick field workers.	Musculo-skeletal disorders probably due to their work posture, working environment and related lifestyles.
Madhusudan M, (2014)	Occupational Health Profile of Beedi Workers in coastal Karnataka	The objective was to study the socio-demographic profile and morbidity profile of beedi workers.	A cross sectional study was done among beedi workers in urban field practice area of A.J. Institute of Medical Sciences from April 2010 to March 2011, which consisted of 1035 families with a total population of 4434.	Majority were female beedi workers. Beedi rolling plays an important role in the household economy. Most common morbidity was musculoskeletal problem, followed by eye and respiratory problems.
Mohammad Akram, (2014)	Occupational Disease and Public Health Concerns of Migrant Construction Workers: A Social Epidemiological Study in Western Uttar Pradesh.	1. Exploring the availability of basic health goods; 2. Identifying exposure to pollution; 3. Studying the patterns of afflicting injuries and diseases;	On the basis of composite development index 9 different districts of Uttar Pradesh are classified as: developed; moderately developed; less developed and backward. This social epidemiological10 study is conducted in six districts from the western region.	Most among them can count their wages. More than half (51.7 per cent) of the male workers are having elementary level or above education.
Nahid Sultana, et al, (2014)	Health Problems among Women Building Construction Workers.	To explore the health problems among the women building construction workers.	The study was conducted from September 2011 to December 2012 in the Department of Community medicine, Dhaka National Medical College, and Dhaka. The subjects were selected from different building construction sites of old	The workers who complain of backache, 52(54.1%) were brick breaker and 16(42.1%) were weight carrier. 79 (58.9%) respondents used personal protective equipments, among them 61(77.2%) used self made hand gloves and 38(48.1%) used folded towel to carry weight. Besides of the total respondents

			Dhaka city.	117(87.3%) complain of different types of respiratory problem.
Rajanna.K. A, (2015)	Socio-Economic Status of Women Workers In Construction Industry: A Case Study.	1. To analyse the Socio-Economic status of women construction workers in the study area. 2. To analyse the working conditions of women workers in study area. 3. To find out major findings of the study area.	The total area of Chikmagalur district is 7201 sq. km and number of Hoblies 34, the seven Taluks of the district have been further sub divided into 34 Hoblies (revenue cities) and density population per sq. km 1587 and sex ratio is 1008 in 2011. In this study, multistage stratified random samplings technique has used.	Large numbers of women workers are un skilled and work as an agricultural labourer as soon as the season ends, they shift to the construction industry which increases their employment level in the industry by doing so they support to their husband in income generation, for meeting their house hold expenditure. Majority of the women workers are married, after the marriage they move with their husband.
Chinna Ashappa, (2015)	Human Rights of Women Construction Workers in Gulbarga City	Human rights are basic rights as the weaker sections such as lower castes; women, children, etc are frequently deprived from these rights.	As such, to examine the human rights of women working in construction sector, a survey of total 50 women construction workers was made through interview schedule in Gulbarga city.	The findings revealed that there are violations of human rights of women construction workers.

Mala.M, (2015)	Economic Empowerment of Women Construction Workers In Kinathukkadavu Taluk of Coimbatore District in Tamil Nadu	The study aims at- identifying the major issues related to socio economic profile of women construction labourers.	To gain more knowledge on the occupational empowerment of women living in Kinathukkadavu taluk, of Coimbatore dist. of Tamilnadu and the factors influencing the concept of empowerment of women,	More than 35 percent of the construction workers are women. Unlike other industries where women are employed in semi-skilled or sometimes even in skilled jobs, in the construction industry they are employed only as unskilled labourers.
Vaidya.V. G, et al, (2015)	Occupational Health Hazards of Women Working in Brick Kiln and Construction Industry	To study the effect of work site environment on the health of the women. Working in brick kiln and construction industry.	A cross-sectional study was conducted among the working women (age 18-40 years) at brick kilns and construction sites during summer and winter season.	There were 66% of women who were in the age group of 18-40 years and most of them (94%) were married. At brick kiln sites, average CO exposure was 62.8 ppm and 55.5 ppm and average dust exposure was 3 3 146.1 mg/m and 91.4 mg/m in summer and winter season respectively. At construction sites, average dust exposure was 41.5 ppm and 90.8 ppm in summer and winter.
Saikala.L, et al, (2015)	A Study on Work Stress among Architects and Construction Professionals in Indian Construction Industry	To identify the key stress factors among construction professionals including architects, engineers, builders and other related specialists involved in building construction industry.	The study involved a questionnaire survey to 117 professionals randomly selected from 56 public and private sectors ongoing building projects among four major cities in India (Chennai. Hyderabad, Mumbai and Gujarat).	This paper concludes that the adequate capacity to undertake projects, capability to handle, establishing and maintaining budgets and time frames for project delivery, proper provisions at sites and offices, confirm to appropriate design practices and education of professionals in stress management will result in better scope of work and less stress among professionals at various levels in building industry.

Occupational Health Hazards –A Critical Review

The studies on occupational health hazards of women construction workers in the non-farm sector emerged from the year 1974. In the beginning the studies concentrated on marital mobility and health disparities. Andrea Tyree et al. (1974), Cook W. K. (1979), Further, the studies reached their peak in occupational risk and women workers. Occupational Disease and Workers' Compensation: Coverage, Costs, and Consequences. Paul Leigh J. (2004).

The majority of the studies covered mechanical, chemical, mental, biological and physical hazards. Guddi Tiwary, et al.,(2011), Dana Loomis, et al.(1997), Bharara K., et al.(2012), Kumuda Bandhu Jadab (2012), Tiwary G., et al. (2013), Lioyd W., et al. (2009), Senthil Kumar Nakkeeran, et al.(2010), Shain M. (2010), Hafiz O. (2010), Thoreia Mohamed Mahmoud, et al. (2004), and Peter O. Kalejaiye (2013).

Gaps in Literature

There are many studies that have discussed and reviewed the occupational health hazards of the construction workers. Most of the literature reviews on occupational health hazards of women construction workers are in the field of community medicine, environmental studies, and psychological, sociological and general medicine. Only few studies are available in economics. (Poongodi R. (2011), Suman Kalyani K., et al. (2008), Romanian Parliament (2006), R. S. Nithin Prasad, et al. (2011)) Therefore, the researchers of this paper make attempt present economic issues related to health hazards of construction industry workers, with a focus on women workers.

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