A Study on Occupational Hazards among Construction Workers with Special Reference to Coimbatore City

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Abstract: World health organization (WHO) showed that more than half of all occupational injuries and deaths worldwide among construction building workers. The aim of this study was to assess occupational hazards and their relation with health problems among construction building workers at Coimbatore City. The study also assessed the distribution of occupational injuries and common risk factors of these injuries among workers in the construction industry. A detailed descriptive study was undertaken in the construction industries of Coimbatore with a focus on workers employed in the industrial area. The occupational hazards among construction workers in vary from the very minor spells of aches and pains to severe and even potentially fatal disorders. Major occupational health problems include musculoskeletal disorders, hearing loss, vibration, and contact dermatitis. These problems are preventable through pretesting equipment, products and processes and exposure monitoring and risk assessment are an essential component of occupational health and safety programmes. Occupational health programmes need to be an integral part of the general safety and health approach and medical surveillance is essential to ensure the fitness of workers as well as their suitability for certain construction jobs. Education and training for the construction workers would assist by giving detailed descriptions of safe work practices.

Keywords: Construction Industry, Occupational Injuries, Diseases, Risk Factors.

I. INTRODUCTION

Construction is the process of preparing for and forming buildings and building systems. Construction starts with planning, design, and financing and continues until the structure is ready for occupancy.

Construction is a high hazard industry that comprises a wide range of activities involving construction, alteration, and/or repair. Examples include residential construction, bridge erection, roadway paving, excavations, demolitions, and large scale painting jobs. Construction workers engage in many activities that may expose them to serious hazards, such as falling from rooftops, unguarded machinery, being struck by heavy construction equipment, electrocutions, silica dust, and asbestos.

The construction industry is a sector of the economy that transforms various resources into constructed physical economic and social infrastructure necessary for socio-economic development. It embraces the process by which the said physical infrastructure are planned, designed, procured, constructed or produced, altered, repaired, maintained, and demolished.

The industry comprises of organizations and persons who include companies, firms and individuals working as consultants, main contractors and sub-contractors, material and component producers, plant and equipment suppliers, builders and merchants. The industry has a close relationship with clients and financiers. The government is involved in the industry as purchaser (client), financier, regulator and operator.

Occupational Hazards

Occupational health hazards refer to the potential risks to the health and safety for those who work outside the home. According to the World Health Organization, this represents about 70% of adult men and up to 60% of adult women throughout the world, and an estimated additional 40 million adults enter the global workforce each year. Of course, the specific occupational hazards faced by this large and growing number of people depends on the region and its economic standing, but there are some of the common hazards faced by workers worldwide. An occupational hazard is a working condition that can lead to illness or death. Occupational safety and health also commonly referred to as occupational health and safety or workplace health and safety is an area concerned with the safety, health and welfare of people engaged in work or employment. The goals of occupational safety and health programs include: to foster a safe and healthy work environment. It may also protect co-workers, family members, employers, customers, and many others who might be affected by the workplace environment.

Types of Occupational Hazards in Construction Industry

As an industry, the field of construction is one of those that present hazards to workers. These work hazards can be due to negligence in the construction site, faulty handling of equipments and materials, lack of
proper coordination between laborers, and sometimes, the blatant disregard of work site safety rules. Research shows that the following are the most common hazard found at construction sites:

1. Hazard from Scaffolds
   As a temporary platform for supporting workers and materials alike in construction sites, faulty scaffold system can cause both workers and materials to fall. It is highly necessary that scaffolds be secured for maximum safety possible.

2. Power Access Equipment
   Using proper eye and ear protection should not be disregarded if one is to avoid accidents that come from power tool equipments. Nail guns are the most common power tool that causes injuries to workers. It should be noted that guards should be appointed on power tools to prevent such injuries that can necessitate cuts and amputations.

3. Ladder Hazard
   Tipping off from a ladder is the most common cause of injury in construction sites. Another possibility of injury looms when someone places materials at the top platform. These materials can fall off on the worker who unwittingly moves the ladder without knowing that danger lurks from above.

4. Roof Work Hazard
   Roof work can be very dangerous, and even fatal, when no fall protection is available. Even when there is a fall protection, it can still be dangerous when anchors are not properly secured or when more than one falls protection system is attached to a single anchor.

5. Manual Handling
   Manual handling of materials and equipments is also one of the most common risk factors in construction work. The use of proper safety gears must always be observed in handling materials and equipment to prevent any mishap in the workplace.

6. Plant and Machinery
   Plant and machinery used in construction includes heavy equipment such as heavy duty vehicles. These can cause serious injuries if not properly handled.

7. Excavation
   Excavation is also a major cause of accidents, and even death, in construction sites. A collapsed excavation, for instance, can trap workers. If not rescued right away, the sheer weight of soil can render the unable to breath and dead in a matter of a few minutes.

8. Fire and Emergency
   Faulty electrical wiring, as well as exposed wires, can be a cause of electrocution, and even fires. As it is, overhead and buried power lines in construction sites carries extremely high voltage and can very well be a source of imminent risk.

9. Hazardous Substance
   Substances such as solvents, primers and adhesives, wood dust, plastic woods, sealing agents, wood protectants, insulation, and products used in structural engineering work carries health hazards that is hard to quantify right away as it effects generally occur later on. These substances are potent transdermal substance, carcinogens, embryotoxins, mutagens, and neurotoxins.

10. Noise
    While noise is generally disregarded by most people in the construction site it can cause such risk as the loss of hearing.

11. Protective Clothing
    Without the use of protective clothing, workers expose themselves to injuries. Protective clothing, however, will only remain effective if used within its set parameters. They can be risky if not properly maintained and cleaned. Contamination with toxins renders protective clothing susceptible to ignition from open flames.

12. Hazard to the General Public
    The most common type of accidents that may affect the public in construction sites involves equipment such as forklifts and dump trucks. If not properly maneuvered, these equipments may hit a pedestrian at any given moment.

13. Lifting and Body Straining
    This is a health hazard that results from carrying such items as sheets of drywall, plywood, or siding using the back instead of using one’s legs and panel lifters.

14. Unsafe Working Areas
    Unsafe working area is obviously the most common source of job-related injuries. In construction sites, unsafe working conditions include open holes, trenches, stakes and rebars.

**Construction Industry**

Construction is an important component of the developmental work in our country. Nearly half of the government expenditure in its Five Year Plans has been devoted to construction activities - be it in the area of
irrigation, power, roads, surface transport, communications, health, housing or urban development. This sector attracts huge investment from individual house owners as well as from big contractors/companies, having a very high rate of return. In recent years, this has been one of the fastest growing sectors of the economy. After agriculture, it is the largest provider of employment for people, with one out of every seven workers in the country employed in construction-related activities. However, construction is among the most unregulated sectors in the country. The large numbers of workers employed in construction work are not provided even with minimum safeguards. They continue to work under extremely hazardous and exploitative conditions. With nobody to support them during their needs, they have very little opportunity to improve their lot. Such condition prevail not only in Coimbatore where the present study is located, but all over the country.

Employers

Construction workers are faced with a wide and sometimes bewildering range of employers. Most of them are forced to shift regularly from one job to another, from one employer to another, and from one area of work to another. The size and nature of employers is diverse. The employers can be small house owners or big industrialists. The employer may also be a labour supplying contractor, a petty contractor, a small contractor or a large builder. There are large contracting companies like the multinational Larsen & Turbo, or Tamil Nadu State Construction Corporation, and Bridge & Roof, state and central government undertakings respectively. The government through its various departments - like the PWD, irrigation, railways, highways, electricity boards, rural development, etc. - can also be an employer. In fact, government is the single biggest employer in the construction industry.

The Workers

The building and construction industry employs a wide range of skilled workers. These are masons, carpenters, plumbers, electricians, painters, bar-benders, mosaic workers, stone breakers, workers specializing in laying tiles, varnishers, etc. Among the skilled workers, there are various gradations of expertise and competence. For instance, there are semiskilled workers who in the parlance of the industry are called ‘arra-kottanar’ (half-mason), and ‘mukka-kottanar’ (three-quarters mason). Apart, from the skilled and the semi-skilled workers, there are unskilled ones who do most of the manual work. Unskilled workers in Tamil Nadu are referred to as ‘chittal’, the lowest category of workers in the hierarchy and the ‘periyal’ the higher category of helpers. Typically, chittal are women construction workers and adolescent male workers. The adolescent boys graduate into being periyal after one or two years of experience. Most skilled workers start their apprenticeship as chittal. Gradually they acquire some specific skill through informal apprenticeship and experience. They pursue this skill as a trade or profession thereafter. All skilled workers, without exception, are trained on the job and have no formal training. Some workers from the highly skilled category acquire enough experience to take up work on piece-rate. A handful of the piece-rate workers are able to become petty-contractors and some of them may even become labour supply contractors. The petty-contractors, sub-contractors and labour supply contractors are referred to as ‘maistri’, which is a deferential way of addressing them. The piece-rate workers also like to be called maistri as a sign of their respectability.

There are also specific groups of workers who work collectively and specifically as concreting gangs, earthwork, well-diggers, timber workers, tree-fellers etc. The concreting gangs work for long hours with little or no rest, under most hazardous and arduous conditions, working as a human conveyor belt. The well-diggers’ and earth-workers’ lot is no easier and they are provided with no protective gear of any kind.

Relationship between Worker and Employer

Workers have different types of relationships with their employers. There are a few common ways in which they are directly and indirectly connected with their employers:

- **Market Gangs**, constituted by pauperized and individual workers, who have no tools of their own and look for wage labour from day to day.
- **Maistri Attached Labour** who have a reasonable assurance of work and thus do not have to bargain on a day to day basis, as they are attached to one or more maistri. They are paid either on a daily or weekly basis.
- **Site Labour** who are migrants, almost bonded to the contractors. They appear to have greater continuity of work, but have no bargaining capacity and work for relatively lower wages.
- **Specific Groups** like concreting gangs, earthworkers, etc., who work collectively, with one among them taking greater responsibility or working as a ‘maistri’

A significant feature of this industry is that there is an absence of enduring relationship between the employer and the workers. A unique aspect is that while the product of labour is static, the workers are mobile. When the construction activity is completed the workers move on. From the point of view of the principal employers, the work is only of a temporary nature. Therefore, they have no long-term interest in improving the styles of the working and living conditions of workers. This enables the principal employer and the contractor to escape from their responsibilities and obligations. It also perpetuates the existing system of contract and sub-contract.
II. REVIEW OF LITERATURE

In a systematic review of construction safety studies, Zhou et al. (2015) found that of all the research topics 44.65% were pertinent to safety management process, 20.27% to the impact of individual and group/organizational characteristics, and 33.03% to accident/incident data. The body of research on safety management process involves safety planning, safety monitoring, safety assessment, safety measurement, safety performance etc.

Dr. Singla Surinder Kumar, Ms. Bala Poonam and Mr. Kumar Sanjeev in the Asian Journal of Research in Social Sciences and Humanities (2014), defined that unorganized sector is a pivotal part of the Indian economy as it provides employment to a major chunk of the labour force (more than 90 per cent). However, the workers in this sector are not enjoying the same benefits as enjoyed by that of organised sector. The socio-economic conditions of unorganised sector workers are deplorable as they are deprived of many social security benefits. Construction industry being one of the largest industries in the country and a part of unorganised sector is providing employment to a good number of labour forces. But, the situation of the workers in this industry is not very much different from other unorganised sector workers. The situation of female workers is even more critical than male workers.

Thayyil Jayakrishnan, Bina Thomas, Bhaskar Rao and Biju George (2013), studied that construction workers are at a greater risk of developing certain health disorders and sickness than workers in many other industries. In India the construction workers are mostly migrants from remote villages, often are less educated and not cautious about different preventive measures. Most of them are inter-state migrants and has poor language skills that prevent them from understanding the safety precautions given and to voice their problems. Apart from this, in most of the construction projects the workers employed are unorganized in nature and often not guided by the legislations made for the health and welfare of the workers and hence are not eligible for free or subsidized care.

Guddi Tiwary and PK Gangopadhyay (2011), stated that in India, as the construction workers are mostly illiterate, it is desirable to impart health education to them, to apprise them of the ill effects of work and the remedial measures. Awareness programs and local group discussions are essential for improving the health status of these working communities.

Emily Q Ahonen, Fernando G Benavides and Joan Benach in the Scandinavian Journal of Work, Environment & Health summarizes the information on immigrant occupational health. Increased migration is a reality in industrialized countries all over the world, and it has social, political, and economic consequences for migrating groups, as well as for their sending and host societies. More reliable data, targeted appropriate interventions, and enforcement of existing regulations are necessary to improve the health of immigrant workers.

V. Arndt, D. Rothenbacher, U. Daniel, B. Zschenderlein, S. Schuberth and H. Brenner studied that musculoskeletal diseases and external causes are major factors limiting the work capability of construction workers and lead to an increased proportion of occupational disability in their cohort occupational health exams conducted among the construction workers in Wurttemberg (Germany), aged 25-64 years.

Labour Rights of India states that working and living conditions of construction labour are deplorable. The studies and surveys on construction labour highlight their poor plight. The problems are common to both Naka Market workers and other construction workers. Apart from the nature of the construction site in terms of its time span and locations, poverty, lack of literacy and lack of awareness about their rights and potentialities contribute to their inability to organize themselves. The employers or contractors too prefer non-unionized labour because it helps them in having control over them as per their profit motives. Another aspect of the sufferings of the construction workers is the prevalence of occupational diseases. Women and children suffer from a number of diseases like asthma, bronchitis, skin diseases, diseases of reproductive system like hydroceles and gynaecological problems. Construction workers suffer more because if they fall sick and remain absent, they lose wages with chances of losing job itself. Intermittent sickness, poor nutrition, and continuous work also lead to premature ageing and low life expectancy.

Statement of the problem

The research is being conducted to bring out the problems prevailing among the workers of the building construction industry. The workers, irrespective of the gender, face several problems in their workplace as well as their personal, social and economic life. The workplace is filled with numerous hazards both related to health and safety. The workers are mostly illiterate or unaware about the safety measures to be adopted in the construction work. The workers are mostly migrants from North India and so there exists a language barrier which prevents them from gaining knowledge about their rights. Apart from the health hazards, the workers also have indifferences in fair wages and compensation plan, since they migrate from place to place in search of better economic stability. The major hazard among the construction workers are the harassment and psychological stress created both in the workplace and personal life. Hence this research analyses these aspects of occupational hazard so that it serves as a reference to further researches in this field.
Objectives Of The Study

- To analyse the demographic profile of the workers in the construction industry.
- To identify the different occupational health problems among construction workers.
- To identify the awareness level of the occupational safety and welfare measures among construction workers.
- To find out the psychological stress of the construction workers.
- To find out the problems related to wages and compensation plan of the construction workers.
- To suggest strategies to reduce the occupational hazards.

III. METHODOLOGY & TECHNIQUES USED

Research Design
Research design stands for advance planning of the methods to be adopted for collecting relevant data and the techniques to be used in their analysis. The research design used in this study is descriptive in nature which studies about the characteristics of a particular individual, or a group.

Target Respondents
The target respondents for the study are the construction workers belonging to different construction sites and few places.

Sampling Design
The sampling design adopted in the research is stratified sampling method under probability sampling & convenience sampling method under non-probability sampling.

The respondents were segregated into three strata based on the type of construction workers as follows:
1. Migrant workers
2. Domestic workers
3. Naka market workers

Sampling Size
The sampling size selected for the study is 141 respondents chosen from the three strata equally as 47 respondents in each stratum.

Chi-Square Test
Comparison between Gender and Occupational Health Problems

Null Hypothesis
H0: There is no association between gender and occupational health problems.

Alternative Hypothesis
H1: There is an association between gender and occupational health problems.

Level of Significance
α = 0.05

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>CHI–SQUARE</th>
<th>SIGNIFICANCE</th>
<th>ACCEPTED/REJECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust &amp; Fumes</td>
<td>5.168</td>
<td>.270</td>
<td>ACCEPTED</td>
</tr>
<tr>
<td>Overcrowding</td>
<td>2.576</td>
<td>.631</td>
<td>ACCEPTED</td>
</tr>
<tr>
<td>Proper lighting</td>
<td>29.822</td>
<td>.000</td>
<td>REJECTED</td>
</tr>
<tr>
<td>Drinking water</td>
<td>4.357</td>
<td>.360</td>
<td>ACCEPTED</td>
</tr>
<tr>
<td>Latrines &amp; Urinals</td>
<td>9.925</td>
<td>.019</td>
<td>REJECTED</td>
</tr>
</tbody>
</table>

Inference:
The above table shows that the significance is below 0.05 and so there is an association between gender and the factors such as proper lighting and latrines and urinals. Also there is no association between gender and the other factors of occupational health problems.

Comparison between Type of Family and Welfare Measures

Null Hypothesis
H0: There is no association between type of family and welfare measures.

Alternative Hypothesis
H1: There is an association between type of family and welfare measures.

Level of Significance
α = 0.05

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>CHI - SQUARE</th>
<th>SIGNIFICANCE</th>
<th>ACCEPTED/REJECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing/shelter</td>
<td>22.007</td>
<td>.000</td>
<td>REJECTED</td>
</tr>
<tr>
<td>Overtime allowances</td>
<td>2.949</td>
<td>.566</td>
<td>ACCEPTED</td>
</tr>
<tr>
<td>Transportation</td>
<td>19.093</td>
<td>.001</td>
<td>REJECTED</td>
</tr>
<tr>
<td>First aid</td>
<td>3.859</td>
<td>.425</td>
<td>ACCEPTED</td>
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<tr>
<td>Festival bonus/advances</td>
<td>3.827</td>
<td>.281</td>
<td>ACCEPTED</td>
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</tbody>
</table>
Inference
The above table shows that the significance is below 0.05 and so there is an association between type of family and the factors such as housing / shelter and transportation. Also there is no association between type of family and other factors of welfare measures.

Comparison between Gender and Psychological Stress

Null Hypothesis
H0: There is no association between gender and psychological stress.

Alternative Hypothesis
H1: There is an association between gender and psychological stress.

Level of Significance
α = 0.05

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>CHI - SQUARE</th>
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<td>Working hours</td>
<td>12.341</td>
<td>.015</td>
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<tr>
<td>Work nature</td>
<td>1.401</td>
<td>.844</td>
<td>ACCEPTED</td>
</tr>
<tr>
<td>Saturday work</td>
<td>7.395</td>
<td>.116</td>
<td>ACCEPTED</td>
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<tr>
<td>Family time</td>
<td>23.013</td>
<td>.000</td>
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</tr>
<tr>
<td>Break times</td>
<td>5.134</td>
<td>.274</td>
<td>ACCEPTED</td>
</tr>
</tbody>
</table>

Inference
The above table shows that the significance is below 0.05 and so there is an association between gender and the factors such as working hours and family time. Also there is no association between gender and the other factors of psychological stress.

Correlation

Correlation: 4.3.1

Correlation between Average Income and Health Expense

Null Hypothesis
H0: There is no relationship between average income and health expense.

Alternative Hypothesis
H1: There is a relationship between average income and health expense.

Level of Significance
α = 0.05

<table>
<thead>
<tr>
<th>CORRELATION VALUE</th>
<th>SIGNIFICANCE</th>
<th>POSITIVE / NEGATIVE</th>
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</thead>
<tbody>
<tr>
<td>.273</td>
<td>.001</td>
<td>POSITIVE</td>
</tr>
</tbody>
</table>

Inference
The above table shows that there is positive correlation and the significance is below 0.05 so there is a relationship between average income and health expense.

Correlation between Average Income and Expenses for Alcohol and Drugs

Null Hypothesis
H0: There is no relationship between average income and expenses for alcohol and drugs.

Alternative Hypothesis
H1: There is a relationship between average income and expenses for alcohol and drugs.

Level of Significance
α = 0.05

<table>
<thead>
<tr>
<th>CORRELATION VALUE</th>
<th>SIGNIFICANCE</th>
<th>POSITIVE / NEGATIVE</th>
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</thead>
<tbody>
<tr>
<td>.411</td>
<td>.000</td>
<td>POSITIVE</td>
</tr>
</tbody>
</table>

Inference
The above table shows that there is positive correlation and the significance is below 0.05 so there is a relationship between average income and expenses for alcohol and drugs.

Suggestions
- The workers are unaware of the first – aid to be provided in case of accidents hence they should be provided awareness about the safety measures and the usage of first – aid box.
- The workers should be provided with life insurance by the employer.
- The workers should be provided with lunch and drinking water facilities by the employer.
- The wiring in the site with wires should be replaced by electric cables to safeguard from accidents.
- The workers should be provided with safety gears like shoes and goggles.
- The migrant workers are not provided with proper accommodation as they are unaware of the need for proper shelter for construction workers.
- The women workers should be provided with medical benefits and rest room facilities.
- The workers should be provided with proper sanitation facilities.
The workers from Naka market do not get the work every day as the contractors select only the workers who are members of the Construction Workers Association / Union formed locally among the workers. Workers who are not a member are given the least preference. Hence the workers who are unable to pay the subscription are deprived of work.

The workers should be encouraged to save their earnings instead of spending it on alcohol and drugs for the better living conditions.

The employers should provide separate funds for educating the workers’ children.

The employers are employing migrant workers for low wages which affects the living of domestic workers. This condition is increasing at a constant pace in the city where the employers are neglecting the domestic workers as they have to be paid more wages. This is paving way for furtherance of researches in this field.

IV. CONCLUSION

This research has provided the comprehension about the construction workers and the problems faced by them in their work and workplace. The workers are either oblivious or lack knowledge about the safety and welfare measures to be adopted in the workplace. The workers give less or no importance to their health despite of the hazards prevailing in the construction industry. The workers are working very hard for their economic wellbeing but the wages earned are not sufficient to meet their day-to-day living. Moreover the workers face competition from migrant workers and they are reluctant to work for lower wages unlike their counterparts.

The workplace has to be equipped with proper safety and welfare facilities. The workers have to be given proper awareness about the usage of such facilities and equipments. The workers, irrespective of the gender, are prone to many hazards in their occupation. Proper awareness and initiative from both the contractor and the employer will prevent the occupational hazards. The research has proved that the workers’ occupational hazards have a direct effect on their personal, economic and social life. Thus the research has set the milestone for the betterment of the construction workers in their work, workplace and personal life.

V. REFERENCES

Books

Journals