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## **Review Article**

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## Risk factors of morbidity among construction workers: a review

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## **ABSTRACT**

Construction industry is the second largest employer of workers the world over and is second only to the number of workers in the agricultural sector. Since construction industry and workers come under the un-organized sector, they are not benefitted by any of the advantages enjoyed by the workers in the organised sector. Most of the workers belong to the poor socioeconomic background and illiterates who are hired by the agents based on the construction manpower needs on a daily wages manner. Migrant workers from poorer and under developed areas of the country are increasingly being exploited for this purpose. The rigorous and strenuous construction work and their temporary and shabby living conditions make them vulnerable for several types of diseases and ill health, for which they may not get adequate and timely medical care and support. Workplace safety and workers safety are often compromised. They constantly face physical, chemical and biological risk factors. Risk factors and risk behaviour like smoking, tobacco use, alcoholism and even substance abuse among the construction workers contribute to their high morbidity and even mortality. This review article focuses on the various risk factors and the risk behaviours, which the construction workers are exposed and are prone to develop, leading to different types of morbid conditions at the work place as well as in their places of living.

**Keywords:** Diseases, Illness, Workplace, Labourer, Hazards

## **INTRODUCTION**

Occupation is a basic need for every individual/family in order to earn a livelihood, by engaging in a suitable work/job in an organised or unorganised sector. Occupational health is concerned with health of the workers in its relation to work and working environment where they work to earn an income. Based on the employment conditions, occupation has been classified into two major sectors: organized sector and unorganized sector.

The organized sector is one that is incorporated with the appropriate authority or government and follows rules and regulations stipulated by them. On the contrary, the unorganized sector consists of small and scattered units,

which are not under the control of the government. It is characterized by low wages, extended working hours in unfavorable working conditions and insecure jobs.<sup>2</sup> Unorganized sectors mostly consist of agricultural labourers, contract labourers, construction workers and home-based workers enrolled in different small-scale activities.<sup>3</sup>

The construction industry is the second largest industry of the country after agriculture sector and it makes a significant contribution to the national economy and provides employment to large number of people. Construction activity is an integral part of country's infrastructure and industrial development and is poised for further growth. Developing the country's infrastructure is the major role of construction industries. It accounts for nearly 65% of the total investment in infrastructure and is

the second largest employer and contributor to gross domestic product (GDP) accounting for nearly 7% of the GDP in the country.<sup>4</sup>

The Indian construction industry was the ninth largest market in the world and accounting for 3.3% of global market share, as per the global construction 2020 report by Oxford economics. From 2014-2020, India is pegged to be the second largest market with an estimated compound annual growth rate (CAGR) of 8.9%. According to the survey of bureau of labour statistics, construction industry workers occupy half the world's total population of approximately 14.1% of the population. Up to 180 million construction workers are there worldwide, out of which about 75% are in developing countries.<sup>5</sup>

In spite of the fact that construction industry is the second largest employer, the industry has emerged as the principal industry in the unorganized sector employing a large number of skilled, semi-skilled and unskilled workers belonging to the poor socio-economic background and employing large number of migrant population. Recently the construction industry has also emerged as the principal industry employing migrants from different parts of the country where they have low job opportunity and hence facing poverty.

Construction workers are at high risk of exposure to physical agents like heat, light, vibrations and chemical agents like paints, chemicals, dyes, silica dust and asbestos which makes them susceptible for various types of acute and chronic diseases. Diseases like pneumoconiosis, ischemic heart disease, chronic obstructive pulmonary diseases, acid peptic disease and carcinomas like lungs cancer, and skin cancer are common among construction workers. They are engaged in many activities that may expose them to unguarded machinery, being struck by heavy construction equipment, electrocutions, working at high attitudes, and falling from rooftops leading to severe physical impairment and lethal injuries.<sup>6</sup>

Thus it can be inferred that most of the construction workers involved in the construction industry are suffering from one form or other morbidities involving different systems of the human body. The workload of the construction workers is a physically challenging one and is task oriented. Construction workers work in different circumstances and they will be moving to different floor levels constantly for shifting cement, bricks and sand, which is the routine practice. During this process they are prone to accidental injuries and most of the time the construction workers are faced with serious injuries at the work spot.<sup>7</sup>

## **MORBIDITY**

Morbidity can be defined as "an untoward event or complication, which under optimal conditions, is not a natural consequence of the patient's disease or treatment". Morbidity also refers to the consequences and complications (other than death) that result from a disease.<sup>8</sup> Morbidity refers to having a disease or a symptom of disease, or to the amount of disease within a population. Morbidity is any physical or psychological state considered to be outside the realm of normal sense of wellbeing.<sup>9</sup>

The term morbidity is often used to describe illness, impairment, or degradation of health, especially when discussing chronic and age-related diseases, which can worsen over time. For example, the commonest forms of morbidity in the United States in 2013 was grouped into the following 10 conditions: heart disease, cancer, chronic lower respiratory diseases, stroke, Alzheimer's disease, diabetes mellitus, pneumonia and influenza, kidney disease and suicide. These accounted for almost 75% of deaths. Seven out of the 10 leading causes of death are chronic diseases.<sup>9</sup>

## **RISK FACTORS**

Construction workers can be exposed to many risk factors during their working life and they therefore face an increased risk of developing health problems. The risk factors can be either due to the macro environment related to their working conditions and also due to their personal habits and lifestyle. A risk factor is a characteristic, condition, or behaviour that increases the likelihood of getting a disease or injury. Risk factors are often presented individually, however in practice they do not occur alone. They often coexist and interact with one another.

## **HAZARDS**

A hazard is a potential source of harm or an adverse health effect on a person or persons. "Hazard" and "risk" are often used interchangeably. The risk of ill health or health hazard in construction work may be grouped under three categories: physical, chemical and biological hazards. <sup>10,11</sup>

## Physical injury hazards

These are often caused by equipment used such as scaffolds, power access equipment, ladders, plant and machinery for excavation and processes such as manual handling, and roof work.

## Chemical hazards

These are found in construction work include asbestos, welding fumes, spray paints, cutting oil mists, solvents and hexavalent chromium. Effects of some health hazards are chronic while some are acute.

## Biological hazards

Biological hazards are often due to the exposure to infectious micro- organisms (bacteria, viruses, and fungus), toxic substances of biological origin or animal attacks. Since there is constant change in the composition

of the labour force and also change of sites, with unfavorable environment, individual workers come in contact with other workers and, as a consequence, may become infected with contagious diseases like influenza, tuberculosis, typhoid, diarrhea, and dysentery. Workers may also be at risk of affected by diseases like malaria, dengue fever, leptospirosis, and Japanese encephalitis, if work is conducted in areas where these organisms and their insect vectors are prevalent.<sup>12</sup>

# RISK FACTORS OF HEALTH PROBLEMS IN THE CONSTRUCTION INDUSTRY

Construction is one of the largest industries in the world and it is also one of the most dangerous industries and one involving the most physically demanding work. According to European agency for safety and health at work (EU-OSHA), "more construction workers are killed, injured or suffer ill-health than in any other industry". Every year more workers are killed and more workers are injured and others suffer ill-health.

The main health problems faced by workers in the construction industry are found to be in the form of musculoskeletal disorders, hearing loss, vibration, skin diseases, respiratory diseases, cardiovascular, ear nose and throat (ENT), central nervous system (CNS), and psychosocial health problems. Based on the earlier studies, some of the common risk factors identified for theses health problems are discussed.<sup>13</sup>

## Musculoskeletal disorders

The construction industry has one of the highest rates of musculoskeletal disorders with 75% of the health problems reported by construction workers were musculoskeletal. Construction workers mostly reported complaints in their back and in lower extremities and they have a reduced ability to perform tasks and in the most serious cases they could even become permanently disabled.<sup>13</sup> Musculoskeletal problem is considered as a major problem of construction workers due to the handling heavy materials by these workers. Some of the risk factors like high exposure to stone load and bricklayers can cause musculoskeletal problems. The findings by Latza et al revealed that the work-related musculoskeletal symptoms such as neck pain, shoulder pain, upper back pain, lowerback pain, legs pain, feet pain, head heaviness and whole body fatigue was observed among construct ion workers.<sup>14</sup>

## ENT problem

ENT problem is the common problem of construction workers because in construction sites are one of the causes of high noise pollution. Nearly 35% of the construction workers experience significant noise levels during their working time and this can cause permanent hearing loss. Construction worksites are often temporary, mobile and located outside environment and hence they are considerably exposed to high intensity noise throughout

the working day.<sup>13</sup> The studies conducted by Merck, Rampal and Ismail in noise induced hearing loss (NIHL) revealed that it is one of the main problems among the construction workers who were exposed to the noise levels of 85-120 decibels.<sup>15,16</sup>

A study done by Hiranandani observed that the sinusitis problem is common in construction workers due to the dusty environment of construction sites.<sup>17</sup>

#### Vibration

Nearly 63% of construction workers are regularly exposed to vibrations at work. Hand-arm vibration diseases normally result from the use of powered hand-tools, which could damage the nerves and blood vessels in the hand and arm. Operating heavy machinery and vehicles can cause whole-body vibration.<sup>13</sup>

#### Skin diseases

More than 15% of the construction workers are handling or touching dangerous substances during working hours, including rough materials. This can cause occupational skin problems such as dryness, redness and itching of the skin. The skin may become swollen, cracked, scaly and thickened, and blisters and occupational dermatitis may develop. 13 Studies by Jolanki et al showed that the allergic skin problems or skin ulcerations occurred in construction workers due to the exposure of chromium materials.<sup>18</sup> Study conducted by Lakhani revealed that the skin cancer is occurred due to over exposure of prolonged radiation.<sup>19</sup> Shah and Tiwari observed that construction workers, who handle cement materials, were susceptible to irritant and contact dermatitis. In addition corrosive effect from alkaline ingredients, such as lime can leads to allergic contact dermatitis (from the ingredients, such as chromium) among the workers in construction sites.<sup>20</sup>

## Respiratory diseases

Diseases such as silicosis, asbestosis and cancer are common among construction workers. Most of the construction workers are exposed to vapours and fumes at least half of their working time. Prolonged occupational exposure may cause considerable damage to the lungs and may even lead to the development of other respiratory diseases such as silicosis, asbestosis and cancer. The respiratory problems might be occurring due to the exposure factors like diesel exhaust from machines, dust from the ground, and wood dust from sawing, fumes from welding, roofing or paving, dust from using pneumatic tools on concrete or other stone work and cement.<sup>13</sup>

Sundaraj conducted a cross-sectional study on respiratory problems and reported that 17.7% of workers had chronic asthma; 12.9% had chronic bronchitis; 23.5% workers had chronic rhino-sinusitis and 54.4% of construction workers had peak flow abnormality.<sup>21</sup>

## Cardiovascular problems

There are many risk factors, which can lead to cardio vascular problems among construction workers. National institute for occupational safety and health (NIOSH) reported that the prevalence of cardio vascular problem in adults in the construction sector due to the exposure of toxic heavy metals like lead.<sup>22</sup> Several earlier reports by Hong et al, Pope et al, and Maheshwaran et al proved that the air pollution is an important risk factor for ischemic heart disease, especially the inhalation of wood dust, metal dust or asbestos fumes. 23-25 The analysis by the agency for toxic substances and disease registry (ATSDR) revealed that the usage of copper material also cause eye problems and cardio vascular disorders among construction workers due to the exposure of arsenic materials used in the sites.<sup>26</sup> Earlier studies revealed that the substances present in cigarettes like arsenic, nitrogen oxides, cadmium and others substances causes serious health problem. Phoon reported that the myocardial infarction among unskilled and manual workers is common because of these workers has the smoking habit.<sup>27</sup> Bradshaw et al reported that the high prevalence of smoking habit in males than females was observed in South Africa among construction workers also contributed to heart problems.<sup>28</sup>

## Eye problems

According to the report of ATSDR, chemicals like fluorine and fluorides and agents like aliphatic and aromatic amines used in construction sites may cause eye irritation in construction workers.<sup>29</sup> In the epidemiological studies conducted by Thienen and Spee reported that diesel exhaust is considered as one of the major risk of the health hazards caused eye irritation.<sup>30</sup>

## Fever

According to the study of Basu et al fever is one of the severe health problem particularly among female construction workers.<sup>31</sup> Adsul et al analysed the health problems of migrant construction workers in Mumbai and identified that the 23.11% of construction workers were affected with fever.<sup>32</sup> An epidemiological study of Wheeler and Smallwood reported that welding fumes and certain materials used for coating process and these metals fume released in air, which is harmful to the workers and caused fever.<sup>33</sup>

## **Injuries**

Generally, all skilled, semi-skilled and unskilled workers are at risk of being injured, death or various illnesses in a construction site, although the level of risk varies with activities they are engaged in. Workers of construction sites are generally exposed to an excessive risk of being injured at work.<sup>11</sup> Several studies have documented that some form of external injuries due to varied reasons had affected nearly 45% of workers during their working time. A study conducted by Sashidharan et al in Kancheepuram

district shows that skin injuries like abrasions and lacerations (43%), contusion (26%), cut injuries (16%), foreign body in the eyes (12%) and falling from a height (10%) were common.<sup>34</sup> Gauchard et al reported that more than one-third of the workers had major accidents occurred due to the time pressure to complete the work, which is mostly by compromising the safety precaution to follow.<sup>35</sup>

## CNS problems

According to the report of NIOSH the CNS problem of adults in the construction sector was due to the exposure of toxic heavy metals like lead, which is widely used in several construction materials like paints.<sup>36</sup> The similar finding was observed by Dick in the use of organic solvents in construction purposes which might cause CNS problem.<sup>37</sup>

## Urinary tract infection

Limited studies are available in describing the risk factors of urinary tract infection (UTI) among construction workers. The unhygienic contamination conditions at the workplace and living areas will be a major risk factor for UTIs. As per the report of ATSDR the excessive use of copper compounds and other heavy metals in construction industries might cause damage to the kidney.<sup>38</sup>

## Psychosocial health problems

The construction industry has one of the highest incidences of psychosocial health problems such as stress, fatigue and burnout. Several studies have shown that the psychosocial health problems among construction workers are very high due to various factors. Time pressure, low social support from the supervisors, low job autonomy and skill discretion were found to be important risk factors for work-related stress and lower work ability. Psychosocial risk factors might also be associated with musculoskeletal symptoms and (non-) fatal accidents at worksites. Study done among bricklayers showed the following prevalence of self-reported mental health effects: high need for recovery after work (14%), distress (5%), depression (18%) and post-traumatic stress disorder (11%).

## Infectious diseases

The construction workers were made to reside in makeshift camps in the project sites that expose them to health risks even during and after working hours due to air, water and soil pollution. The poor environmental conditions at work sites increases the chances of diseases from poor sanitation and unsafe drinking water. The construction and living sites create breeding grounds for various vectors and exposes the unprotected laborers to vector borne diseases. In addition, the construction workers are also prone to be exposed to new strains of multi drug resistant organisms.<sup>39</sup> Adsul et al in their study found that workers were suffering with any kind of fever were 23.11% followed by respiratory infections in 12.6% of the workers. Of the total

cases of fever, 20.71% were suspected to be of malaria with a slide positivity rate for the malaria was 8.11%.<sup>32</sup> Table 1 shows that the risk factors like smoking, alcoholism, other forms of tobacco use and the type/nature of the work shows predominance in the presence of any one form of morbidity among the construction workers.

Figure 1a shows the relationship of presence of any type of morbidity with that of the type of different categories of workers. Respiratory and eye problems and external injuries are found to be more among the skilled workers, smokers and alcoholics. Figure 1b shows that the presence of any type of morbidity is very high among all categories of construction workers. Similarly musculo-skeletal problems, skin problems and abdominal problems were also found to be high among the workers.

Several studies have shown that the highest incidence of morbidity among the construction workers was caused due to musculoskeletal problemss, external injury, skin and eye problems, abdominal symptoms, respiratory, dental and urinary problems, fever, ENT problems, CNS problems and cardiac problems along with psycho-social problems which were widely prevalent among the workers. Prevalence of smoking, alcohol consumption and tobacco usage among workers was found to be very high, compared to other demographic characteristics in the population. It is proved beyond doubt that tobacco usage, smoking and alcoholism contribute to various acute and chronic debilitating diseases.

Table 1: Risk factors/behaviours and presence of any one morbidity among the study group in an urban area of Kancheepuram district.

Risk factors	Total number	Any one morbidity pattern	
	(302)	Number	Percentage
Smoking habit			
Present	193	177	91.7
Absent	109	65	59.6
Alcohol habit			
Present	190	175	92.1
Absent	112	67	59.8
Tobacco habit			
Present	174	154	88.5
Absent	128	88	68.8
Type of work			
Skilled	177	162	91.5
Unskilled	125	80	64.0
Marital status			
Married	142	123	86.6
Unmarried	160	119	74.4
Type of food			
Vegetarian	14	8	57.1
Non-veg	288	234	81.2

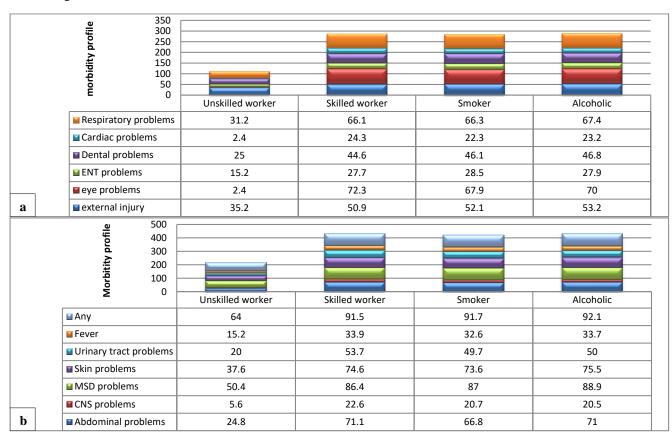


Figure 1 (a) and (b): Morbidity pattern and its association with risk factors.

Regarding the health seeking behaviour of the construction workers, it was found that majority of construction workers preferred allopathic medical facilities, mostly in the private sector for their medical treatment when they fall ill. This adds to their out of pocket expenditure since most of the time they avoid government health facilities because of the inconvenience due to the timings. This was found to be due to the existing knowledge gap and focus on convenience, which adds additional financial burden in their medical care. 42

This review found that there are multiple and varied risk factors and behavioural problems among the construction workers, which makes them prone to develop frequent illness and diseases which adds to their high morbidity profile.

#### **DISCUSSION**

## Risk behaviours

From the above reviews from several studies done among construction workers from varied socio-geographical locations, it can be inferred that the exposure to the physical, chemical and biological agents and poor working and living conditions are considered as the major risk factors for most acute and chronic health related problems, which are manifested as communicable or non-communicable diseases. High rates of smoking, alcohol, and other substance use in the construction workers are documented in a number of studies. These habits are found to be having a direct or indirect influence on the occurrence of diseases/illnesses among them.

Even though, overall smoking incidences have declined in recent years, the data show that smoking rates are more than twice that of other workers and construction industry is consistently among the highest smoking industries, a strong association between occupation and alcohol use has also been noted, with workers in physically demanding occupations reporting drinking more frequently, drinking in larger quantity, and more frequently binge drinking. These risky behaviours are associated with workplace injuries, as well as excess smoking and alcohol related deaths among construction workers.<sup>40</sup>

Mohankumar et al in their study on morbidity profile and associated risk factors among construction workers in an urban area of Kancheepuram District, Tamil Nadu, found the following risk factors/behaviours which can be related to their high morbidity burden (Table 1).<sup>41</sup>

## **CONCLUSION**

In order to overcome these risk factors and risk behaviour, the construction firms must ensure screening of its workers regularly for detecting any exisiting health problems for early diagnosis and prompt treatment. During the screening process, the habits of consumption of alcohol or substance abuse or tobacco use should be identified and

appropriate counselling sessions carried out in order to reduce their risk behaviours. It is essential to provide the necessary personal protective devices and medical aids for these workers who are always at risk. It is essential to have health education sessions for creating awareness on how to improve their health and nutrition status and the importance of preventing alcohol and substance abuse, which must be implemented for the workers at regular intervals.

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