The impact of construction activity on human health

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Abstract

The impact of construction activities on human health has been building into a significant concern over the years. In spite of the innovation in the field and the possibility to mitigate this risk, there is very less done in this direction.

This paper categorises the human health impact into two categories – acute and occupational hazards. With the information and inferences from the literature review and case study, the most relevant parameters that would define the path towards a safer, responsible and responsive relationship between people and building industry have been identified.

The study dwells into various aspects like team skills, efficient work environment, work ethics, preparedness, etc. that bridge the gap between design and construction phase.

Keywords

Efficient work environment, work ethics, preparedness, planning strategies, acute hazards, occupational hazards, relationship between people and building industry, bridge gap between design & construction phase

1. Problem Statement

It has been observed that better safety at the work leads to more productivity and timely completion of the project within the estimated budget. Whereas, when a worker is prone to health problems it may lead to various long term and short term health issues like, cancer, repetitive stress injuries, muscular pain, skin irritation, asthma and other respiratory diseases. These aspects may result in project delay, cost overrun, low quality of work. Resulting in poor performance and production. Thus, it is necessary to identify the different types of health issues to avoid any further problems. This can only be done if the health issues are foreseen. It is necessary to identify why? These kinds of problems occur.

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In 2015 she joined ARH – (Architect Rushikesh Haldankar) in Mumbai and worked on several major projects. From 2017 she moved to the role of an academician with Dr. Baliram Hiray College of Architecture, Mumbai. She works on various streams like architectural documentation, history and has a keen interest into understanding construction techniques, technology and management.

2. Methodology and Objectives

The main objectives of this paper are:

- To identify the causation for the gap between the design and construction phase and understand the effects these causes are having on physical and psychological well being.
- Distinguishing the various categories of human health issues based on the impact. (long term/short term, direct/indirect)
- Create a checklist which will help take a closer step towards healthier physical spaces

The above objectives will be achieved by using the following methods:

- Literature review - through online research, journals, conference papers, and books to review different literature written about the gap in the design process between the design and construction phase.

3. Literature Review

Construction work is hazardous in nature. Preparedness, awareness and planning are ways to minimize the risk that comes with any site where work is in progress.During the design phase, lack of interaction between the designers, executing team, vendors and other stakeholders is the main factor that causes ambiguity and issues on site.

- *Gap between design and construction phase* - Identifying areas where prevention efforts have to be taken when different stakeholders are involved. Adversarial nature of the construction industry has been leading to different teams functioning as individual entities and being a block in the free flow of a project. (Mohsen & Othman, 2016)
- *Lack of supervision and timely inspections* - Important aspects like regular monitoring, quality check, inspections and safety protocols are all overlooked on some level.
- *Human Errors* - The blame cannot be only on human unsafe characteristics (Abdelhamid and Everett, 2000) but also on lack of training, conditions and organizations at site.

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Table 1: Categorizing health hazards based on period taken for impact

Exposure Condition	Exposure	Example
Chronic *(Delayed, generally for years)*	Continuous over a long period	Working with asbestos
Acute *(Immediate)*	Short term & high concentration	Fall from scaffolding

Source: Authors

Effects of some health hazards are chronic while some are acute, as categorised in Table 2. Occupational/Chronic hazards usually develop slowly, and shall cause sickness or death after a certain period. For example, if a worker breathes small amounts of asbestos fibres, he may not notice the effect of that immediately. However, if the worker inhales a small amount of asbestos fibres for a prolonged time, the chances of getting asbestos related diseases like lung cancer will increase. (Vitharana, G. H. M. J. S. De Silva, and S. De Silva, 2015) Acute hazards develop immediately within minutes, hours and or a few days after exposure like fall from height, fire accident etc.

Table 2: Categorizing most common acute and occupational hazards

Occupational Hazards	Acute Hazards
Musculoskeletal disorders	Falls and being struck by objects
Exposure to Chemicals causing issues like Cancer and Respiratory dysfunctions	Temperature extremes Exposure to sun - Heat strokes, rashes, exhaustion. Cold climate - Frostbite, Hypothermia.
Hearing loss	Electrocution, Fire and Explosion
Dermatitis	Heavy lifting, use of excessive force and over exertion
Psychosocial Symptoms	

Source: Authors

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The health effects that have been associated with constructions are quite diverse. It remains a high-risks industry and has led to a high percentage of injuries and fatalities. According to the ILO (International Labour Organization) 2.3 million fail to resist work related accidents and diseases every year which leads to 6000 deaths every single day.

3.1. Occupational Hazards

- *Musculoskeletal Disorders* - This is caused by job activities and conditions, like lifting, repetitive motions and working in confined areas. Strains and Sprains are the most common injuries but these pave the way for long term health issues like back pain, tendonitis, hand arm vibration syndrome etc. which can restrict you from moving easily. (Construction Safety Council, 2012)
- *Cancer* – Construction sector accounts for over 40% of occupational cancer deaths. It is estimated that past exposures in the construction sector annually cause over 5,000 occupational cancer cases and approximately 3,700 deaths. The most significant cause of these cancers is asbestos (70%) followed by silica (17%) working as a painter and diesel engine exhaust (6-7% each). (Health and Safety Executive, 2021)
- *Respiratory Exposure* - According to OSHA, the respiratory hazards that construction workers are commonly exposed to include lead dust, silica dust, solvent vapors, isocyanate vapors, and other toxic substances (OSHA 2019). (Liu et al., 2020)
- *Hearing loss* - Construction work takes place in noisy environments. Despite safety regulations requiring hearing protection, a staggering 50 percent of construction workers experience some degree of permanent hearing loss.
- *Skin conditions* - There are multiple variations of skin conditions that workers can develop and most often conditions like Dermatitis get severe over a period of time and are difficult to get rid of completely.
- *Psychosocial Symptoms* - Construction workers need to remain focused and alert to manage the variety of on-site hazards. Based on self-reported mental health effects reports, the common psychosocial symptoms were: high need for recovery after work (14%; 25%), distress (5%; 7%), depression (18%; 20%), and post- traumatic stress disorder (11%; 7%) (Liu et al., 2020)

3.2. Acute Hazards

- *Falls and on-site injuries* - Unsafe and poor quality construction materials, slippery and unclear paths, outdated tools, lack of basic amenities on site, absence of safety gears, and lack of supervision can cause casualties on site which can also be fatal.
- *Temperature extremes* - A change in body temperatures due to extreme work environmental conditions can lead to stress or illness from heat or cold.
- *Electrocution, Fire and Explosions* - Poor wiring and faulty devices very often put the lives of the onsite workers at stake.
- *Heavy lifting & use of excessive force* - This occurs due to lack of workers or machinery to support different tasks. Exertion beyond capacity can cause

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casualties ranging from muscle tear to cardiac arrest.

4. Parameters identified

From the study, the following suggestions are made to reduce health issues due to the gap between the design and construction phase.

- *Interaction between stakeholders* - There has to be better interaction between the various stakeholders of the building construction in order to reduce the above discussed health issues. Interaction between the contractors, stakeholders and vendors must be smooth and scheduled so as to ensure a continuous flow of work. This can also be facilitated by adoption of technology, use of Project Management Tools, as well as hiring of Project Management Teams to supervise the whole process.Else even adoption of simple communication/social media tools like whatsapp,signal etc., will ensure that all the parties concerned are on the same page.
- *Designated Safety and Quality Control team* - Specific teams have to be formed to be responsible for Safety, Statutory and Quality control of the construction activity happening on site. This team has to periodically assess the site for all the concerned parameters and report both to the project office as well as the client.This can also be made mandatory at every site that the construction teams are involved in. These laws must be enforced for small scale projects as well to increase the performance of work flow as well as provide better Safety and Quality.
- *Safety Training Programmes must be made mandatory* - All personnel working in the project must undergo thorough training on the various skills required for that particular construction project. This will help them be better prepared and also improve their alertness which comes with the awareness gained while working on site.
- *Permissible exposure limits for chemicals to be strictly followed* - The use of Carcinogenic and Hazardous Materials must be strictly monitored based on the norms. Regular inspections from Government bodies and supervisions should also be conducted and it has to be audited by a third-party so as to maintain transparency.
- *Personal Protective Equipment (PPE)* - All personnel working on site must be equipped with all safety equipment necessary to protect them from any mishaps on-site as well as protect from any toxic materials being used.
- *First aid and continued medical benefits* - A crucial factor in reducing health problems is for an authorized medical professional to be in touch with the on-site workers to ensure that they can reach out to the medical professional easily in case of emergency. Regular monitoring and check up will help in early diagnosis.
- *Hazard Communication Program* - There must be an efficient communication plan and the workers have the right to know all aspects regarding site situations.
- *Correct work practices and ergonomically designed tools* - The sites must have proper lifting techniques, work station set ups, updated and good quality tools and machinery.

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5. Conclusion

Identifying the root causes for causalities and long term hazards in a construction site is a prerequiste to move towards an integrated construction industry that prioritizes safety and health of all stakeholders involved in the process. The aim of the paper was to enhance the professionals' understanding about the potential risks on site, the possible acute and occupational hazards and, the relevance of active safety management and implementation aspects in a project.

Training for the workers must be provided by contractors about the equipment they use, the conditions on site, potential risks and course of action in case of a hazard. Awareness on possible risk factors and knowledge on how to reduce these risk factors among workers and contractors will enhance site safety. Regualar inspections of work sites and continued medical care for workers must be a priority for all the contractors or builders.

Though the construction phase is a very short period when compared to lifecycle of building, the impact this phase can have is very significant. A well understood site and a well planned construction activity goes a long way in ensuring a safe and healthy environment for all.

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