Work Zone Safety –Introduction

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1.1 General

- The construction industry is one of the most significant industries
    1. In terms of its contribution to Gross Domestic Product (GDP)
    2. In terms of its impact on health and safety of the working population.
- Hence, the construction industry is both economically and socially important.
- According to The International Labour Organization (ILO) (2005), the construction industry provides for around 7% of global employment but is responsible for 30–40% of the world's occupational fatalities.
- Construction accounts for one in every six fatal accidents recorded at work annually.
- About 30% of construction workers in some countries suffer from back pain or other musculoskeletal disorders
- Lingard (2013) citing from the ILO reports that one fatal accident occur every 10 minutes on construction sites around the world.

1.1 General

- Construction fatalities rate for some select countries.

Country	Fatalities (per annum per 100000 workers)	Year
Australia	2.9	2017
Japan	6.54	2015
Singapore	3.1	2018
United Kingdom	1.64	2018
United states of America	10.10	2015
Hong Kong	19.98	2015

- Hong Kong, United States, Japan, Singapore fatal construction accidents occupy first rank in all industrial accidents by number for the year 2015. For the Great Britain, it occupies second rank, while for the Australia it occupies third rank.
- In terms of fatality rate across all fatal industrial accidents, fatal construction accidents in

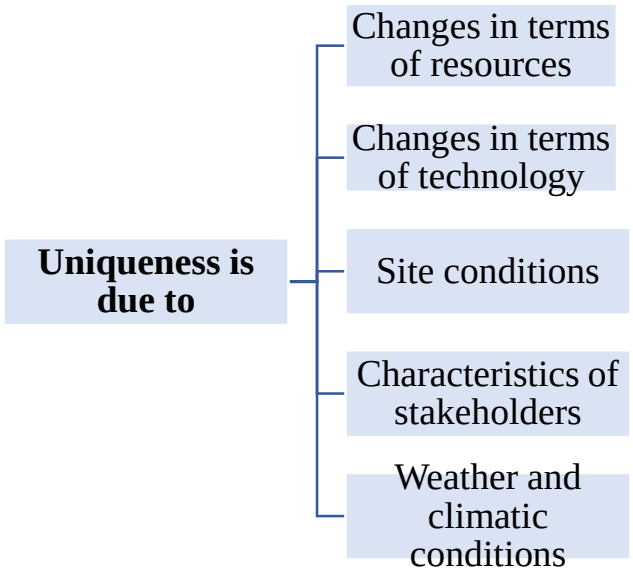
Hong Kong	First
United States	Fourth
Singapore	Second
Australia	Fourth
Great Britain	Third

1.1 General

- The Occupational Safety and Health Administration (OSHA) has reported that
  - One in ten construction site workers are injured every year.
  - Fall hazards are the leading cause of injury at construction sites.
- According to the Bureau of Labor Statistics,
  - There are roughly 150,000 construction site accident injuries each year.
  - Falls make up the majority of the construction site accidents, contact with equipment was also a significant cause of injury for workers.
- Workers between 25 and 34 years old are the most likely to be injured in a construction site accident.
- Most construction site injuries involve construction workers' backs, spines, and trunks.
- The NIOSH (National Institute for Occupational Safety and Health) reported in 2005 that 1,224 construction workers died on the job over the course of one year, making the construction industry the most dangerous industry in the country.
- Statistics really paints a sorry status of the construction industry

1.2 Nature Of Construction

- Unlike manufacturing, construction is a set of **one-off activities**, some independent and some interrelated. They are performed in a temporary set up, and every set up in a construction project is **unique**.



- The uncontrolled environment(Weather and climatic conditions) coupled with the mobility of facilities adds to the problem further.
- A client would like to get his facility constructed/repaired at the lowest expense, On the other hand, a contractor would like to complete the project by spending as little as possible in order to maximize his profit. In this process, **safety and quality are the biggest causalities**.
- The contractual role of designers/consultants/architects with the contractor constructing the facility is also not very clear.

1.3 Injuries And Fatalities In Construction

- Construction industry though important for many reasons is also recognized to be the most hazardous
- Construction accounts for most of the injuries next to mining industry.
- According to Hinze and Applegate (1991),
  - The frequency of occurrence of disabling injuries incurred by construction workers is roughly twice the frequency rate of other industries.
  - The death rate is roughly three times that of other industries.
- Every year almost 100,000 workers are killed on construction sites—one person killed every five minutes because of bad, and illegal, working conditions (Chaing et al 2018).
- Construction industry accounts for about 34% of the total number of fatalities in all industries in the Japan, out of which nearly 20% is represented by works related to building facilities for a period from 2003 to 2014.

1.3 Injuries And Fatalities In Construction

- **USA**
- 774 workers died from injuries suffered on construction sites in 2010, accounting for 16.5% of all industries. As per the U.S. Bureau of Labor Statistics (BLS).
- The fatality rate in construction - 9.8 per 100,000 full-time equivalent workers, fourth highest among all industries.
- Construction industry accounts for 19% of all occupational fatalities, and despite a gradual decline, remains the highest source of fatal occupational accidents (Bureau of Labor Statistics, 2010).
- The construction industry has almost six times as many fatalities and twice as many injuries per hour worked compared with the manufacturing industry (Helander 1991).
- Construction accidents amount to 6 percent of the total construction cost (Helander 1991).
- 1.5 per cent of construction workers were killed, and 5.3 per cent disabled in one year (Gambatese 1998).

1.3 Injuries And Fatalities In Construction

- **UK**
- One-third of all workplace fatalities occurred on construction sites
- It has a fatal injury rate over four times the average level of all industries and was the cause of the largest number of worker fatalities.
- The construction fatality rate has risen over recent years to constitute 21.5% of total occupational fatalities (Health and Safety Executive 2010) in comparison to reportable non-fatal injuries averaged 16 per 1000 workers between 2004 and 2009, significantly higher than the average of 10 per 1000 workers overall (Labour Force Survey 2009).

1.3 Injuries And Fatalities In Construction

Accidents statistics of construction industry of China

Year	Zhang et al.(2019).		Zhao et al. (2018)		Encyclopedia (2004)*
	Number of deaths	Number of accidents	Number of deaths	Number of accidents	Number of accidents
2004	1324	1144	-	-	-
2005	1198	1015	1193	1015	-
2006	1048	888	1041	882	-
2007	1012	859	1012	859	-
2008	921	772	989	814	-
2009	802	684	802	684	812
2010	771	627	772	627	783
2011	738	589	738	589	751
2012	624	489	624	487	643
2013	670	522	670	524	690
2014	583	524	648	522	665
2015	554	442	-	-	563
2016	734	634	-	-	764
2017	-	-	-	-	832
2018	-	-	-	-	851

- Annual construction accidents from all projects throughout China has declined from 1193 in 2005 to 554 in 2015, which shows a decreasing trend.

1.3 Injuries And Fatalities In Construction

- **Singapore**

  - In 2006, there were 24 fatalities in the construction sector, which occupied 39% of the total 62 workplace fatalities (Ministry of Manpower, 2007).

- **Australia**

  - 30 fatalities were recorded, so they were equated to three deaths per 100,000 workers, which was the fourth highest fatality rate of all the industries (Safe Work Australia, 2013).
  - There were 877 000 workers in the Construction industry in 2005–06, and around 75 700 of these workers experienced a work-related injury. This equates to 86 injuries per 1000 workers: 25% higher than the incidence rate for all Australian workers of 69 injuries per 1000 workers (Safe work Australia 2009).

- **Korea:** The construction sector occupied the highest percentage of fatalities among all sectors (Yi et al., 2012).

1.3 Injuries And Fatalities In Construction

- **India**
- Exact data of fatality for the construction industry is not separately available in the case of India
- The frequent news reports of accidents at construction sites suggest very acute construction safety problems in the country.
- Even on large and prestigious projects involving extensive use of sophisticated equipment, advanced techniques of construction, very good subcontractors and workers, a large number of fatalities and major injuries have occurred
- 46 deaths and eight injuries were reported between 2013 and 2016 for a total of 55 accidents in metro construction sites in seven cities across the country (RTI by NGO).
- During the discussion in the Lok Sabha on 16th March 2015, it was pointed out that 77 fatal accidents were reported from various construction sites across the country between 2012 to 2015(NDTV News).
- The data received from police establishments of 24 cities in 17 states show that 452 workers died while 212 were injured at construction sites between 2013 and 2016 (RTI and NDTV).

1.3 Injuries And Fatalities In Construction

- They found that developing countries including India do not have reliable information on their occupational accidents due to lack of proper recording and notification systems. India does not report information for all industries including construction industry to ILO that can be endorsed by referring the website of ILO. The ILO uses information of Kazakhstan and Malaysia to formulate accident rates for India.
- In order to get to know the status of accidents and injuries in the Indian construction, authors utilized

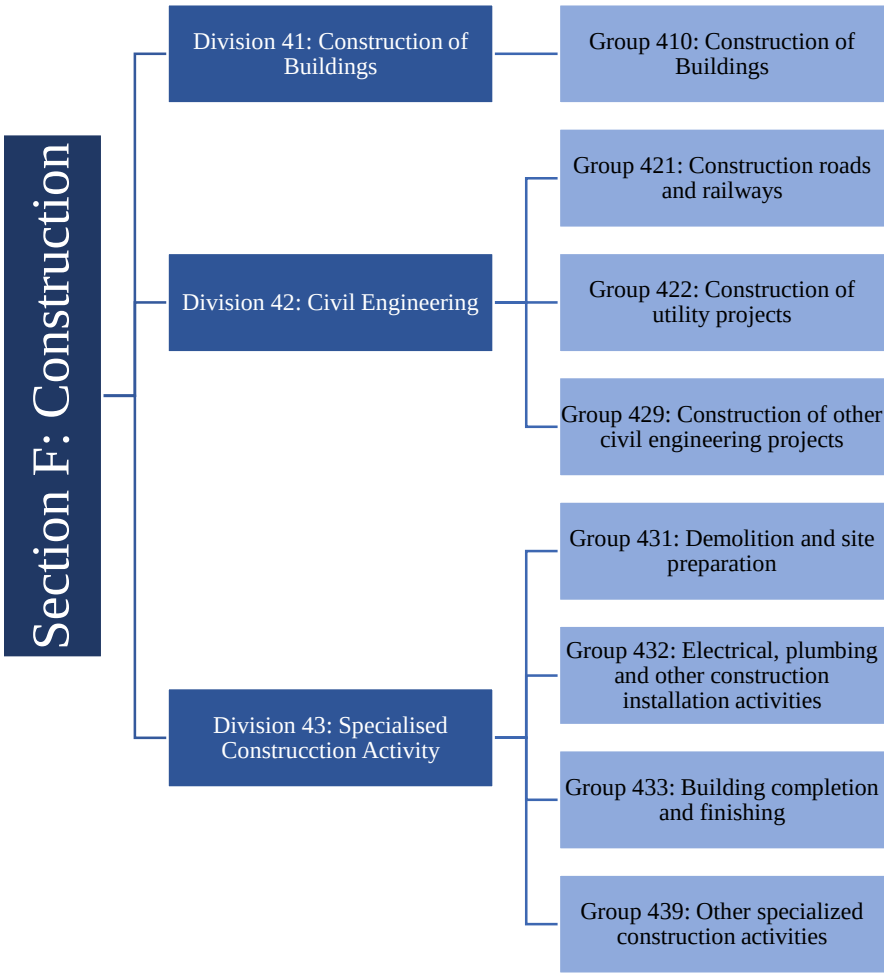
(1) National and international journal	(6) First information reports from police stations
(2) www.indiastat.com,	(7) Medical Legal Registers (MLR) at public health centers and medical hospitals
(3) India country report (2005-2006) CIDC New Delhi	(8) Insurance companies
(4) Websites belonging to various departments and offices of center and state governments	(9) RTI Act
5) Non-government organizations (NGOs)	(10) Rajyasabha and leading newspapers

1.6 Review Of Indian Construction Industry

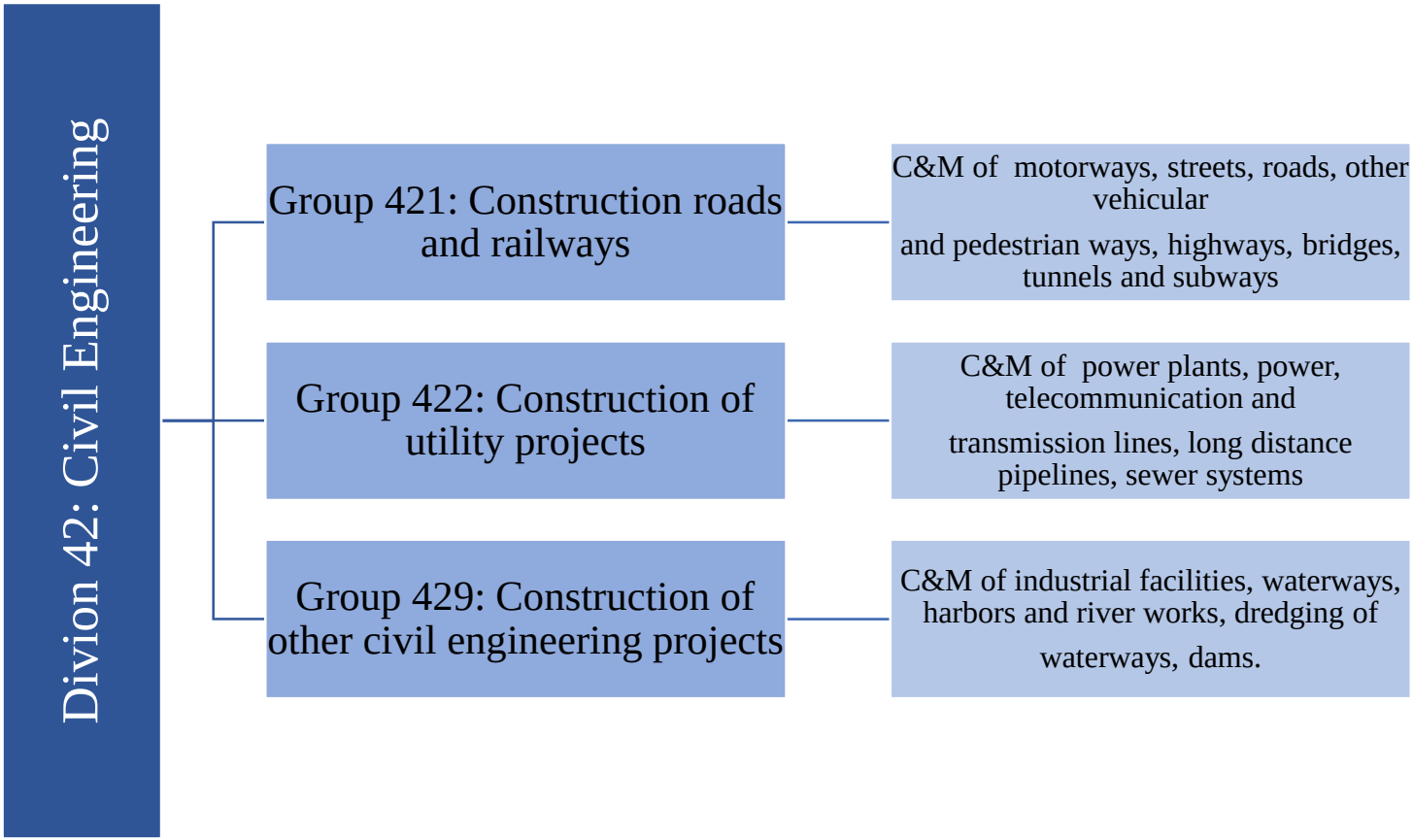
- Second largest industry after agriculture by employing 35 million people.
- Poised to become the largest employer by 2022, employing more than 75 million people.
- The Indian construction industry is presently valued at over USD 126 billion. As per the second advance estimates for the year 2017-18, Gross Value Added (GVA) (at basic prices) by the construction sector stood at USD 140 billion . It is estimated to register a growth rate of 4.3% in 2017-18 as compared to 1.3% in 2016-17.
- Size of the India's construction industry is expected to be USD 1 trillion by 2025. India is expected to be third largest construction market globally by 2030, with its contribution to GDP increasing to 15% by 2030.
- The Indian construction industry comprises 200 firms in the corporate sector. In addition to these firms, there are about 1, 20,000 Class A contractors registered with various Government construction bodies. Total sales of the construction industry have reached 42,885.38 crores in 2004-05 from 21,451.9 crores in 2000-01.
- In India, the construction industry is classified under code 5 according to National Classification of Industry

1.6.1 Construction workers

- NIC-2008 has 21 sections, 88 divisions, 238 groups, 403 classes and 1304 sub-classes.



1.6.1 Construction workers



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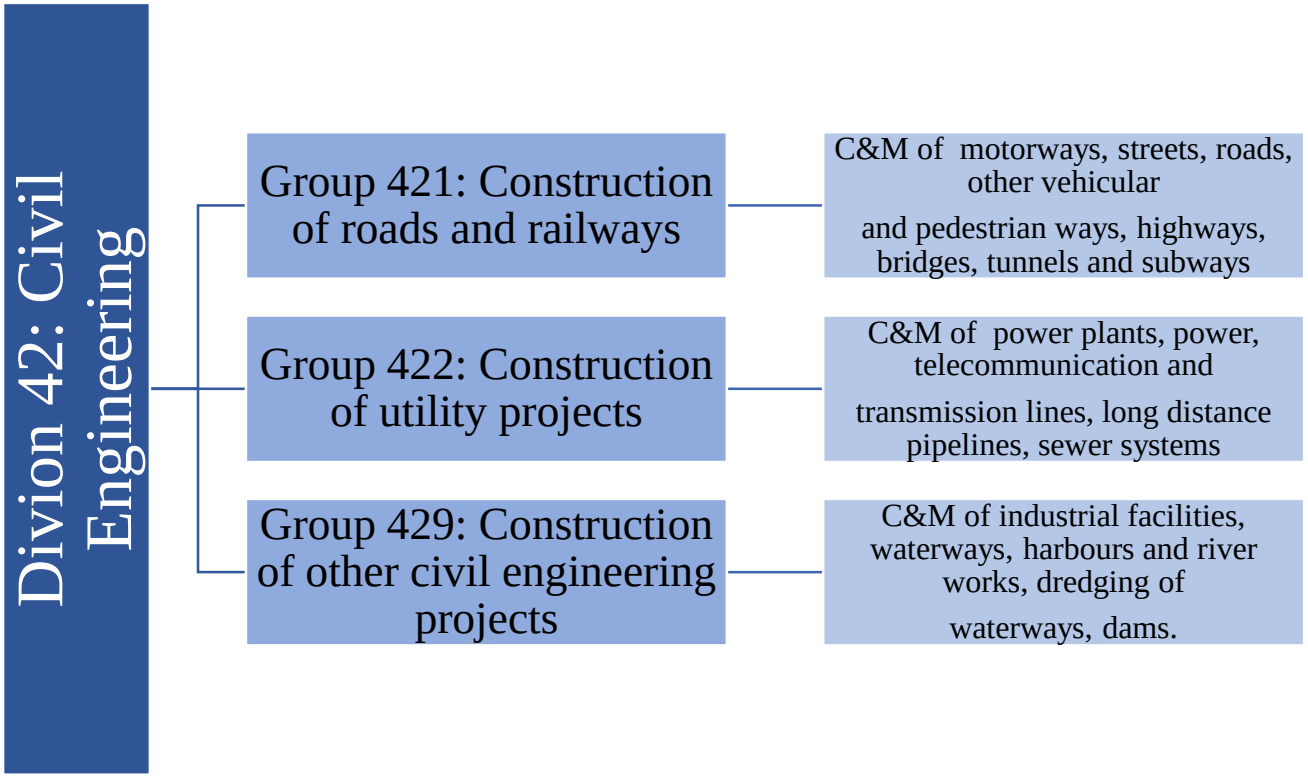
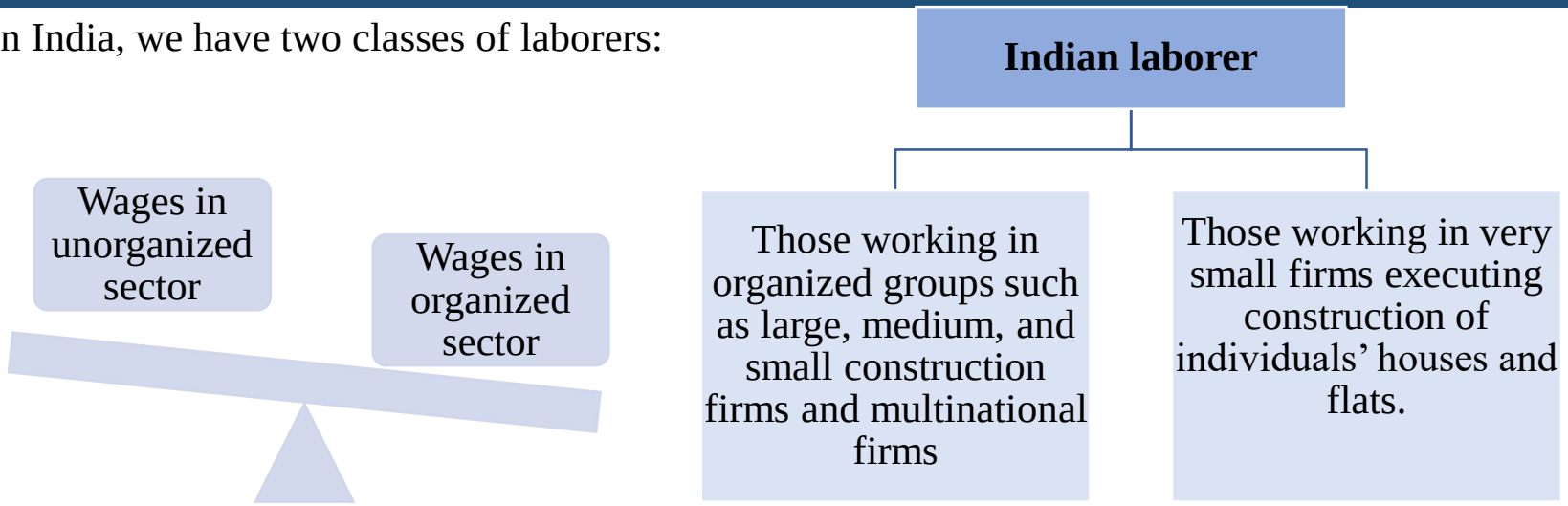
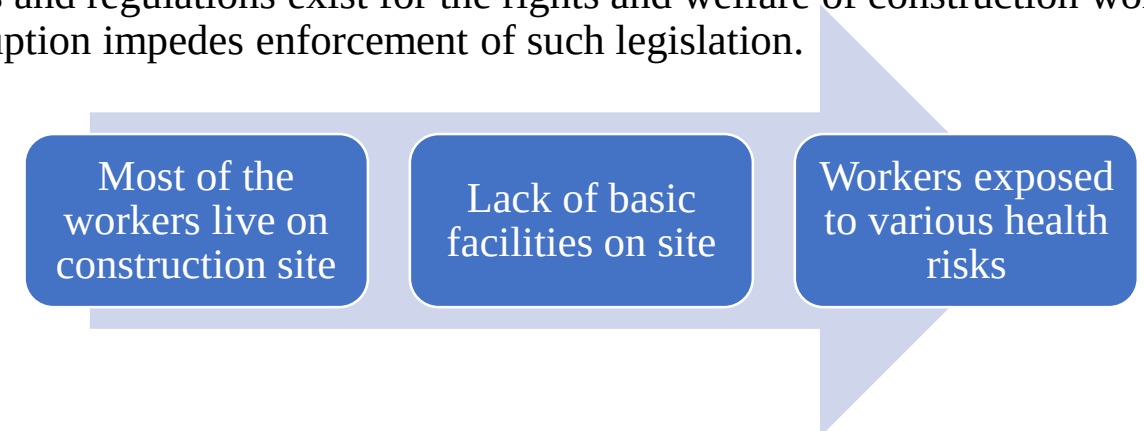


1.6.1 Construction workers

- In India, we have two classes of laborers:



- Construction workers, in general, spend about 10-12 hours on work in very tough conditions.
- Even after a hard day of work, they are not looked after well in their place of stay.
- The conditions of labor colonies in most of the cases are pathetic.
- Migration of labor from one state to another also leads to their exploitation.
- Although laws and regulations exist for the rights and welfare of construction workers, systemic corruption impedes enforcement of such legislation.



1.7 Evolution of safety

•In 1867, Worker's compensation laws were drafted. It is marked as the birth of modern safety movement

•In the initial days, the scope of 'safety' was restricted to accident prevention and to analyze the cause of the accident.

•Later, the scope of 'safety' was enlarged to protect worker's health.

•The word 'industrial' was replaced by 'occupational' to embrace all types of employment instead of restricting it to factories and mines.

In 1937, The International Labor Organization (ILO) adopted a Convention (No. 62) concerning minimum safety standards in the building industry.

In June, 1988, The ILO adopted a comprehensive Convention (No.167) and Recommendation (No.175) on safety and health in the construction industry.

1.7.1 Evolution of safety in India

In 1966,The ‘safety’ movement in India formally started when the National Safety Council was set up

March 4 of every year is celebrated as National Safety Day.

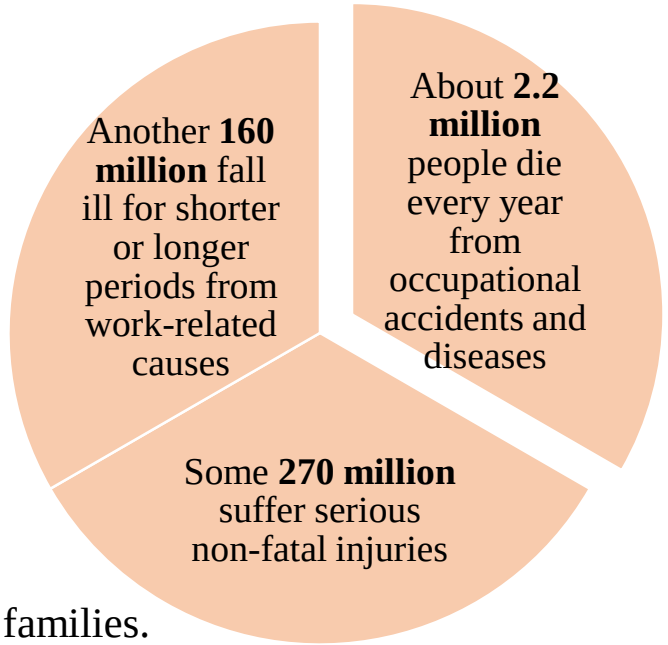
In August 1996,Lok Sabha passed a construction workers’ bill applicable to all employers who employ 50 or more workers on any day at one go or in the relay, to regulate the work conditions on all construction sites.

In 1998, The central rules on Building and Other Construction Workers (Regulation of Employment and Conditions of Service) came in existence, applicable to central establishments.

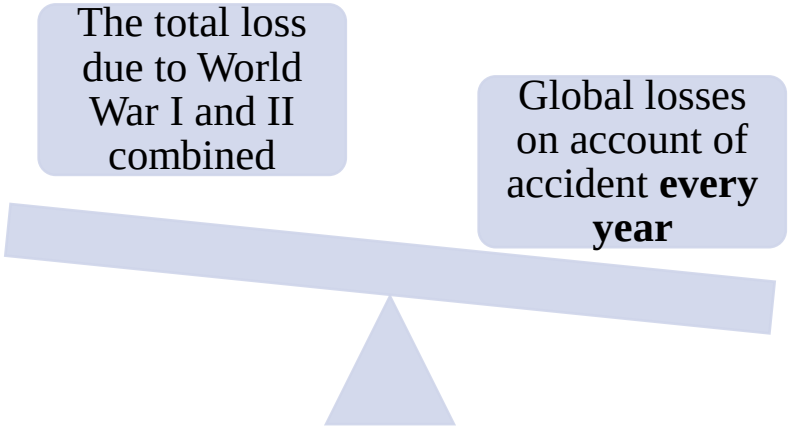
State governments are in advanced stages of framing the rules to be applicable in their respective states.

1.8 Need for safety

- According to an ILO estimate, on a global basis,



- Enormous toll of suffering for workers and their families.
- The total costs of such accidents and ill health amount to approximately 4 percent of the world's GDP **(ILO Geneva, 2003).**



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