CHAPTER- 1

INTRODUCTION

Brick and stone crushing industries are the important unorganised industrial sector in India. Clay fired bricks and different sizes of broken stones & chips are the prime materials of the construction sector of the country which contributes 10 per cent in the GDP and is registering an annual growth of 9 per cent. These industrial sectors provide a large number of employment opportunities to rural unskilled illiterate and less educated workers. In brick industry about eight million workers and in stone crushing industry about five lakh workers are employed in India. Many workers are working in these sectors on a contract basis, subject to the high risk of industrial accidents and occupational health hazard due to lack of safety, health and sanitary measures. In order to safeguard the interest of workers and prevention of accidents/injuries and also different types of occupational health hazards, the Government of India has enacted different laws from time to time. These laws are enacted in the light/spirit of the detailed provisions to safeguard the rights of the citizens laid down our constitution and the “Directive Principles of State Policy”. Directive Principles of State Policy which are in the nature of guidance for the legislative and executive action provide safeguards to workers. Article 24 of the Constitution prohibits employment of child below 14 years for work in any factory or mine or in any hazardous employment Article 39 requires the State to direct its policy to ensure that the health and strength of workers, men and women, and children are not abused and that citizens are not forced for economic necessity to enter a vocations unsuited to their age or strength. Article 42 directs the State to make provision for securing just and humane conditions of work and maternity relief. The Government
shall take steps, by suitable legislation or in any other way, Article 43A ensures to secure the participation of employee in the management of undertakings, establishments or other organizations engaged in any industry. Thus under the Constitution it is imperative that measures should be taken to ensure that all the workers irrespective of their place of employment are assured of occupational safety and health. The Government of India, as one of the founder members of the International Labour Organisation (ILO), derives conclusive guidelines from the conventions, recommendations and codes of practices framed by ILO in this regard. The ILO has so far adopted 182 conventions and 190 recommendations on subjects of workers’ fundamental rights, worker’s protection, social security, labour welfare, occupational safety and health, women and child labour, migrant labour etc. The Govt. of India has so far ratified 39 conventions and the recommendations relating to these 39 conventions have so far been implemented to the extent possible. In the field of occupational safety and health and working environment, ILO has framed 13 conventions and equal number of recommendations out of which Government of India has so far ratified two conventions namely Radiation Protection Convention and Benzene Convention.

According to the ILO international instruments, the prime responsibility for the health and safety of workers in their employments rests with the employers. The employer should provide and maintain a safe and healthy working environment, ensure the provision of occupational safety and health services to workers, and give a high priority to health, safety and the work organization in general in order to reduce the incidence of occupational accidents/injuries and diseases. The employer plays an essential role in the performance of occupational health practice. To ensure its
success, the employer should allocate the necessary resources; demonstrate his desire for workers to participate in the implementation of occupational health programme.¹

On the basis of these Directive Principles and international laws, the Government of India declares its policy, priorities, strategies and purposes. The Government is committed to regulate all economic activities within the country with a view to ensuring that every working employee is provided with safe and healthful working conditions. Accordingly, Government of India enacted the statutes relating to Occupational Safety & Health (OSH) at workplaces namely; the Mines Act, 1952 and Rules and Regulations framed thereunder; the Factories Act, 1948 and Rules framed thereunder; Dock Workers (Safety, Health and Welfare) Act, 1986 and Regulations and Rules framed thereunder; the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and Rules framed thereunder; the Dangerous Machines (Regulation) Act, 1983 and Rules framed thereunder; the Insecticides Act, 1968 and Rules framed thereunder; the Shops and Establishments Act of State Governments; the Beedi and Cigar Workers’ (Conditions of Employment) Act, 1966; the Municipal Solid Waste (Management and Handling) Rules, 2000 notified under the Environment (Protection) Act, 1986; the Manufacture, Storage & Import of Hazardous Chemicals Rules, 1989; the Electricity Act, 2003 etc. These are some of the important statutes covering Occupational Safety and Health aspects of workers. For protection of environment, the government has enacted

- Air (Prevention and Control of Pollution) Act, 1981,

• Environmental Protection Act, 1986,
• Noise Pollution (Regulation and Control) Rules, 2000, and
• Water (Prevention and Control of Pollution) Act, 1974.

Against this background the researcher has undertaken the present research work entitled “A study of the state of implementation of legislative provisions regarding prevention of industrial accidents and occupational health hazards in Brick and Stone Crushing Industries of Barak Valley, Assam”.

1.1. STATEMENT OF THE PROBLEM

Willing co-operation on the part of workers towards the smooth functioning of the organizations in general and the continuance of uninterrupted production in particular, is an agreed condition for the normal functioning of the organizations. Nevertheless, the willing co-operation by the workers alone cannot ensure the delivery of the goods in time and properly. In to-day’s highly mechanized industrial system, machines and chemicals etc. play an important role in increasing quality and quantity of production in spite of the fact that these machines and chemicals often leave some harmful effect on the environment and health of the workers and surrounding people. The industrial workers are the worst sufferers of industrial pollution. They have to bear the brunt of accidents and hazards, sometimes impeding the industrial activities for a short duration and sometimes for a long period.

Therefore, the protection of workers from the risk of industrial accidents and occupational health hazards would naturally place them in a better position to contribute towards the attainment of better organisational objectives.
Thus, protective measures must be taken from different quarters/corners to save the workers’ health from the ill-effects of the machines and chemicals. However, unwillingness of the employers (mostly private) primarily for profit motive, lack of awareness among the workers over the matter, lacklustre arrangement and supervision by the Governments concerned etc. are the reasons which could not lead to the effective arrangement for prevention of and cure against the industrial accidents and occupational health hazards. The Governments nowadays, of course, have made some provisions in this regard, aiming at improving the situation.

To have proper safety and precautionary measures against industrial accidents and occupational health hazards is the fundamental right of all workers. In *Subhash Kumar v. State of Bihar Case*, the court held that right to life includes the right to enjoy unpolluted air and water. If anything endangers or impairs the quality of life in defiance of law, a citizen has a right to move the Supreme Court under Article 32 of the Constitution. Expanding upon this theme in a town planning case (*Virender Gaur v state of Haryana*), the court observed that Article 21 protects the right to life as a fundamental right. Enjoyment of life (including the right to live) with human dignity encompasses within its ambit, the protection and preservation of environment, ecological balance, freedom from pollution of air and water, sanitation, without which life cannot be enjoyed. Any contrary acts or actions would cause environmental pollution. Environmental, ecological, air, water pollution, etc., should be regarded as amounting to violation of Article 21. Therefore, hygienic environment is an integral

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2. AIR1991 SC420, 424 Also see M C Mehta v. Union of India (Delhi Stone Crushing Case) 1992 (3) SCC 256, 257: and Chameli Singh v State of Uttar Pradesh AIR 1996 SC 1051, 1053. When deriving the right to Shelter under Article 21 the Supreme Court held that this right would include ‘the right to decent environment and a reasonable accommodation to live in ‘Shantisar Builders v Narayan K Torame AIR1990 SC 630.

3. 1995 (2)SCC 577
part of right to healthy life and it would be impossible to live with human dignity without a humane and healthy environment. There is a constitutional imperative on the State Government and the municipalities, not only to ensure and safeguard proper environment but also an imperative duty to take adequate measures to promote, protect and improve both the man-made and the natural environment.\(^4\)

In India, a large number of people die in industrial accidents and occupational disease. World Health Organisation (1997) estimated that 10 to 30 per cent of workers in developed countries and up to 30 per cent of the workers in developing countries are exposed to physical hazards and it is found that accidents in industries can be reduced by 50 per cent with the adoption of safety system and changes in behavioural and management practices. It has been estimated that 250 million occupational injuries and 3, 30,000 fatalities occur each year.\(^5\) However the provisions made in this regard to ensure the improvement in the situation are only to a minimal level.

The reason behind it probably is that the governments feel that to ensure the compliance at a minimum level is their unavoidable responsibility and if the employers concerned are willing and can afford to do more in this regard they are free to do so.

In such a situation where the employers’ poor financial conditions and also their unwillingness (for profit motive) do not permit them to do more than what is needed in this regard (in most of the cases), coupled with the fact that the workers are neither greatly aware about the long term ill impact of the menace nor they are properly united, it becomes very important to have a review of the state of

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\(^4\) Ibid at 580-1
implementation of the legislative provisions regarding industrial accidents and occupational health hazards in our industries.

For reasons, largely related to convenience, it has been decided to probe into the affairs of Brick Industry and Stone Crushing Industry in Barak Valley, Assam on the matter. These industries have also been selected for the reason that emissions caused by these units affect the environment badly, and there is need for implementation of the different relevant acts to prevent and control industrial accidents and occupational health hazards.

1.2. REVIEW OF LITERATURE

A good number of studies have been conducted on industrial accidents, occupational health hazards and the implementation of different Social Security Acts. The findings of these studies are discussed under the following subheadings:

1.2.1. Works related to Industrial Accidents

Surianarayanan M and G. Swaminathan\textsuperscript{6} in their article, “Indian Chemical Industry Accident Database—An Effort By CISRA,” analysed about one hundred cases of accidents that took place in Indian Chemical Industry between 1988-2000. They have identified various causes of accidents. It has been observed that electricity is the major cause of any accident. Less attention is also paid by the industries to storage area. In fact storage needs greater care and safety as the quantities are large and the effects would be greater in case of even minor failure.

Sivaprakash P and M. Sakthivel (2011)\textsuperscript{7} examined accidents, hazards and risk in industries. The review focused that safety and security lapses result in accidents and disaster in industries and hence they need to be prevented. Safety education is the proactive development of knowledge, attitude, and behaviour and skill of the workers on safety. Good safe attitude, behaviour and skill evolved by the safety education contribute to the overall accident reduction programme in the industry. The main objectives of safety education are as follows:

(i) To develop safety consciousness among employees, to build up a favourable attitude on their part for safety measures and precautions and

(ii) To ensure safe work performance on the part of each work by developing their skill in the use and operation safety equipment. The safety and security management system should be adopted in a complete manner by providing all the required inputs.

Saha Asim, Sunil Kumar & D. M. Vasudevan (2008)\textsuperscript{8} studied on Factors of Occupational Injury: A Survey in a Chemical Company and observed that chemical industries being the seat of dangerous occurrences frequently resulting in injuries, an occupational injury surveillance study was initiated involving 307 permanent and 419 temporary workers in a chemical company to understand the contribution of different possible factors on injury causation. Workers of lower age were found to be more susceptible to accidents (as evidenced by negative correlation coefficient), though non-significantly. Lower job duration (experience) had a significant impact on injury


causation. Although alcohol habit could not show any significant impact but smoking/chewing habit showed significant effect on accident occurrence. Nature of job had no significant impact but nature of employment was found to have considerable effect on the causation of injuries. Temporary nature of employment was at greater risk in comparison to permanent workers. Therefore, this study revealed that job duration (experience), smoking/chewing habit and nature of employment are significant contributors of occupational injuries and less experienced workers, smokers/chewers as well as temporary employees are at a greater risk.

**Saxena A.N (1978)** estimated the accident rate in Indian industries from the annual returns filed by the industries under the Factories Act, 1948 for 20 years and found that the problem of accidents had been gaining increasingly due to the phenomenal development of Indian industries. He also found that the accident rate in Indian industries was 100 to 200 for the study period of twenty years.

**Herbert Robin et al (2000)** in their article “Work-Related Death: A Continuing Epidemic” focused that work-related illnesses and injuries kill 1.1 million people per year worldwide. Work-related hazards are severe especially in developing countries. In 1992, an estimated 65000 people in the United States died of occupational injuries or illness & 60300 died due to occupational diseases. Most estimates indicate that occupational diseases account for far more fatalities than occupational injuries. An accurate enumeration of occupational disease fatalities is

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hampered by a paucity of data, owing to under diagnosis of occupational diseases and inadequacy of current surveillance system. This article reviewed the epidemiology of death due to occupational disease and injury in the United States. Job-related deaths fall into two broad categories; (i) deaths due to workplace injuries including accidents & (ii) deaths due to occupational diseases. It has been found that the ILO’s recent estimate that globally more than 1 million work related deaths occur each year should reawaken concern about this often overlooked public health problem. Finally, the problem of work related deaths will continue to be even more serious in developing countries than in the United States and other advanced industrial nations. In that case, global prevention efforts will be required.

Knegtering et al (2009) highlighted that accidents are low probability high consequence incidents. They observed that in spite of the development of the process-safety management to a great extend in the last decade, serious accidents still happen.

Kwon (2006) revealed that the ultimate goal of process-safety management is to prevent process related catastrophic accidents from occurrence. The reduction of accident and fatality rates and asset damage caused by accidents were used as an effective measure of process safety management regulation in Korea.


Kurzman (1987)\textsuperscript{13} investigated the Bhopal gas leak accident due to the release of methyl isocyanine gas and found that the lack of safety was the reason for this accident which killed around twenty five hundred people (4000 people, vide Economic Times, Nov, 8\textsuperscript{th}, 1992) and injured two hundred thousand people.

Heinrich (1959)\textsuperscript{14} states, “All accident-prevention work, whether or not it is educationally intended, is nevertheless educational in its effect upon the individual employee whom it necessarily involves. It is evident that well-trained and careful man may avoid injury on dangerous work and that untrained and careless men may be injured under the safest possible conditions. He further states that “Employees should be taught not only that safety is worthwhile, not only that it is their duty to themselves, but they should also be told what specific dangers in their own line of work should be guarded against and what specific things they themselves may do to avoid injury”. He recommended some measures like organisation of safety meeting, publication of public safety bulletins, posters, notices, special letters etc. First aid instruction should also be followed. Employees rule books should be followed.

Saari J, Tech D, Lahtela, J (1981)\textsuperscript{15} studied on Work Conditions and Accidents in three Industries viz. the light metal, electro technical and printing industries. The purpose was to determine the applicability of the systems approach to occupational accidents. The data consisted of 291 accidents and 701 controls. It has

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been found that the stable characteristics of the workers or the environments were not
good predictors of accidents. The clearest differences between the accidents and the
controls involved the worker's situational experience, the frequency of task
occurrence, the familiarity of the tasks, and the mobility of dangers. The complexity
of the information exchange between man and his environment, as well as the
perceptibility of environmental dangers, contributed to the occurrence of accidents.

International Labour Office Geneva (2002)\textsuperscript{16} in its 5\textsuperscript{th} items of the agenda
in 90\textsuperscript{th} session discussed recording and notification procedure of occupational
accidents and diseases in chapter-I, issues related to lists of occupational diseases for
compensation as well as recording and notification purposes in chapter-II, and argues
the case for new ILO instruments in chapter-III. The Governing Body of the
International Labour Office decided to place an item on the recording and notification
of occupational accidents and diseases, including the possible revision of the list of
occupational diseases, Schedule-1 to the Employment Injury Benefits Convention, 1964, on the agenda of the 90\textsuperscript{th} Session of 2002 of the International Labour
Conference, with a view to standard setting under the single-discussion procedure and
highlighted that the development of a mechanism for regularly updating the list of
occupational diseases should be examined by the conference as part of the above
agenda item.

\textsuperscript{16} International Labour Office Geneva.(2002). Recording and Notification of Occupational Accidents
1.2.2. Works related to Occupational Health Hazards

Monga Vikas et al (2012)\textsuperscript{17} examined a study on “Respiratory Health in Brick Kiln Workers”. The objective of this study was to investigate the prevalence and determinants of respiratory symptoms and their association with occupational dust exposure among the brick kiln workers. This study evaluated 120 brick kiln workers occupationally exposed to dust and 80 were executive employees and unexposed as control group. It is observed that brick kiln workers are exposed to dust particles and are susceptible to multiple pulmonary complications. Problems like asthma, chronic obstructive pulmonary symptoms, and silicosis are more common among them. It is found that there is strong association between hazardous environmental conditions and the physical and respiratory health of industrial workers. The decrease in lung function values of industrial workers as compared to control workers can be attributed mainly to respiratory disorders. The absence of pollution control and monitoring devices at workplace add to the hazardous environmental conditions. Moreover most of industrial workers showed reluctance in use of safety equipment which indicates lack of safety awareness and appropriate managerial steps. This is either due to negligence of the company or due to them being uneducated. This resulted in prevalence of occupational health disorders in lungs, eyes and skin among industrial workers.

Sivacoumar, R. et al (2006)\textsuperscript{18} studied on Particulate Matter from Stone Crushing Industry: Size Distribution and Health Effects. A cluster of 50 stone


crushing units located at Pammal, in suburban Chennai, the capital of Tamil Nadu State, India, is a source of high levels of dust generation in the vicinity of the crushers and in the communities surrounding them. It is found that the dust generated from stone crushing activities contain a significant amount of fine inhalable matter. The effect of fine particulate matter can be disproportionately large even though it constitutes only a small fraction of the total suspended particulate matter. The presence of a high percentage of silica in the dust and the particle size distribution further suggest that the occupational environment of the workers and surrounding areas may be hazardous to human health. Air quality and the health survey conducted at the site indicate that the observed dust may be producing significant damage to respiratory health. The study through a combination of extensive air quality assessment and a limited set of health assessment has pointed out the imminent need for a comprehensive occupational and environmental health management strategy for this type of essential small scale industries and it is hoped that the information presented here will be used to provide additional impetus to environmental policy measures for this sector.

**Ilyas, Muhammad, & Farooq Rasheed, (2010)** studied on Health and Environment Related Issues in Stone Crushing in Pakistan. Their study determined how the environmental damages due to stone crushing activities and the health status of the workers are related. They had collected data from 221 respondents from the vicinity of Pull 111 market. The following facts have been found from their study.

- Overall weak correlations were found across income and type of illness.

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• As expected correlation coefficient across age and earnings were positive and high.

• High per cent of trained workers were working as workers/employees.

• Loaders, Miners and Driller were three highest number of work categories.

• Only about 13% respondents were the member of the labour union.

• About 51 per cent of workers had no formal education.

• Self-medication is found to be the most preferable way of treatment.

• Health insurance was not at all available to the workers.

• There were about 24 per cent of workers who received no injury allowances.

• White type soft stone was the most dust creating stone type.

• Only homes of 21 per cent of workers were affected by stone crushing pollution.

• 97 persons (i.e. 44 per cent) died naturally during last three years.

• Deaths due to chest infection were about 14 per cent.

• 58 per cent of workers’ daily wages were just around 150 to 250 rupees.

• 32 per cent of workers were paying health bill in the range of rupees 500 to 2000.

• Eyes infection and backache cases were found to be the most common diseases.

• Labours and loader work class were discovered to be the most sickness prone categories.

• Backache and eyes infection were most frequently found disease.

It was found that 75 persons used protective measures, in which protecting themselves by means of putting cloth around the face were 70, wearing caps were 4
cases and only one worker was found to wear protective glasses. The most obvious cause of these health problems was that there were no appropriate measures provided by the owners of the stone crushing units like breathing filters, masks, goggles, helmets and even clean drinking water as only 37 per cent of workers in their sample found to have access to the clean drinking water. Many workers were of the view that lack of medical facilities in areas where these workers reside also enhanced the gravity of risk to life. It was also observed that Entrepreneurs did not bother about providing health insurance to the workers (all 221 respondents had no insurance policies). Workers were found not entitled for the benefits like pensions and other social advantages.

Khan Rizwana, and Harish Vyas (2008) in their article “A study of impact of brick industries on Environment and Human Health in Ujjain City (India)” focused on the effect of brick industry on water quality of Kshipra River. Towards this, total solids, dissolved oxygen, calcium hardness, and total hardness were estimated. Kshipra River originates from Kshipra Village and there are no brick industries in the vicinity. The objective of the present study was to evaluate the impact of brick making process on environment and human health. The results show that there are adverse effects of these industries on soil, water, air, vegetation and human health. Bricks are mainly made of soil and a number of additives are added to the soil to increase the strength of bricks. The use of excessive amount of soil causes soil degradation. These industries use huge amount of fuel and kiln process used at present in these industries is highly inefficient which leads to air pollution and causes

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damage to vegetation and human health. Apart from these, the waste along with water flows back in the Kshipra River, increasing the total solids, suspended solids, dissolved oxygen, calcium hardness, total hardness etc.

**N. Ambreen. et al. (2012)** examined the status of Occupational Health and Safety in Brick Kiln Industries at Hatter Industrial Estate Haripur, Pakistan and found that it is a legal and moral requirement that owners of the Kilns should provide accident free working environments and basic welfare facilities for their workforce but Pakistan has a poor health & safety status; due to in-adequate medical facilities and illiterate workforce. Workers are exposed to high level of hazards in all sectors i.e. construction, mining industry and agriculture. Brick making is one of the leading sector in construction industry; where workers are mostly from deprived sectors of the society; with low income and where the whole family is involved as one unit. Workers involve in work for 12-14 hours without any overtime. Their income was not enough to full-fill their basic needs. Provision of Personnel Protective Equipments (PPE); a last line of defence for workers and welfare facilities were not made at all in the Brick Kilns of the study area. Some of the major contributing factors to the poor health and safety status of the workforce are poor implementation of the health and safety laws with dangerous, unsafe and polluted working environment.

**Rwanda Stones & Construction Ltd Co. (2011)** conducted a study on Environmental Impact Assessment (EIA) Report for a Stone Crushing Factory and highlighted that the total fugitive dust emission rate for the stone crushing plant will

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not have significant incremental or cumulative dust impact at both sites (i.e. environmental effects and development projects) and should equate to less than 0.5 per cent of the existing total dust emissions. The use of dynamites for blasting of the hard rocks should be used only as the last resort since it can cause shocks to neighbouring populations. The use of the dynamite should not be used to avoid consequences like trauma to neighbouring population and cracking of houses. The erosion from the site can be managed to a minimal only by construction of radical terraces and planting grass and trees for soil stabilization. The study also recommended that (1) Dust suppression machine should be available on each site for wetting of all the materials to avoid effects of dust such as respiratory diseases. (2) All appropriate environmental management measures detailed in this report, together with any other environment management commitments should be implemented throughout the entire life of the project.

**Mustafa Onder & Seyhan Onder (2009)** in their article “Evaluation of Occupational Exposures to Respirable Dust in Underground Coal Mines” highlighted that the objectives of the study were to evaluate the dust concentration conditions in the working areas as well as the occupational health risks associated with exposures to respirable dust. It is observed that the production regions have the higher dust concentration levels and the coal workers’ pneumoconiosis (CWP) is mostly diagnosed in the workers working in production regions. It is also highlighted that production workers are exposed to higher dust concentration levels than the other category of workers. Over exposure of the production workers to respirable dust can cause serious or fatal respiratory disease. Although the mean respirable dust exposure

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in the underground mining regions was found to be below the prescribed Turkish standard of 5 mg/m³, in order to minimize the risk of CWP among workers, the permissible dust levels in Turkey coalmines should be reduced.

Environment Systems Branch, New Delhi (2005)²⁴ studied on Environmental & Social Report for Vertical Shaft Brick Kiln (VSBK) and found that use of internal fuel increases efficiency and reduces emission. It is an energy efficient technology for fired clay brick production economizing on fuel consumption by between 30-50 per cent. Workers are exposed to high concentrations of respirable suspended particulate matters (RSPM) during monitoring and regulating the fire, as the furnace chamber is covered with ash (ash acts as insulator). Even though the brick workers are exposed to these occupational hazards, coverage under any sort of insurance or medical facilities is virtually unheard of. Occupational hazards during loading–unloading are also lower in VSBK. Green bricks are arranged on the top of the stack manually. There is an arrangement for smock control during loading by using dampers. Unloading is done through trolley and crow bars. In order to ensure improvement in the living conditions of worker community, several measures have been suggested.

Soklow Robert (1984)²⁵ studied on “Paper Production and Processing----Occupational Exposure and Environmental Release Study.” The study includes a description of the environmental release of chemical pollutants including an

identification of chemical by products and effluent characteristics. The most significant occupational exposure problems associated with paper making chemicals include fatal exposures to high concentrations of hydrogen sulphide and other sulphur compound emissions, as well as carbon monoxide and chlorine exposures. Occupational Safety and Health Administration (OSHA) sampling tests have revealed these chemicals frequently exceed OSHA standards, thus contributing to problems of short-term accidental and acute exposure.

**Parveen Shabana and R. S. Rawat (2010)** examined occupational hazards in iron foundry workers. Foundry workers are exposed to a unique collection of environmental challenges including noise, heat, vibration, organic and inorganic chemical dust, residue, aerosols, gases, acids and other pollutants. The physical loads, organisational factors, individual characteristics and psychosocial factors have been found to be related to various musculoskeletal symptoms, which consist of a multifactorial mechanism of the work related illness. The metal casting industry is regarded as a typical industry with complex work process generating almost all the risk factors of relevance, a combination of these exposures on the foundry workers are generally found anaemic due to the unhygienic conditions and pollution. The haemoglobin concentration was found gradually decreasing with the increase in age in all groups of three foundries. It is revealed that the environment of foundry is not up to standards for human health and affect the biological system by unwanted materials which are toxic to human’s vital system. A decrement in total erythrocyte count (TEC) and

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haemoglobin concentration (Hb, Cone) has been found in foundry workers which is alarming to take rehabilitating steps.

Singh Ramchandra Prasad and Kumar Amarendra Narain (2014) in their article “The Problems of Informal Sector Workers: A Case Study of the Brick Kiln Workers of Bihar” found that the sector is dominated by one technology i.e. the fixed chimney kiln. However, there is potential to improve the existing technology as well as introducing new cleaner production technologies to reduce pollution and mitigate emissions. Some of the barriers are the lack of awareness amongst brick kiln sector entrepreneurs, lack of demonstration of such technologies in the State and scope in the improvement of the policy and financial regime towards environmentally friendly brick technologies. The brick kiln sector is the most polluting sector among other small scale industries. Currently in Bihar because of a lack of clean technology, the brick kiln sector not only emits high amount of carbon emissions but also other harmful gasses such as Sulphur Dioxide (SO₂), Nitrous Oxide (NO₂), Carbon Monoxide (CO) and particulate matter that is harmful for health as well as surrounding agricultural land, orchards etc. The study also revealed that the loss of soil fertility and associated impacts of soil erosion are serious issues raised by the brick sector. In addition to this 60000 tons of wood per year are used for brick making in the state, causing deforestation in the state.

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Mazumder (2009) observed different activities of brick manufacturing units of Barkhola Development Block Cachar, Assam, and health hazards problems to the people of surrounding area due to the existence of dust particles, fume and emission of different particle matters. The brick kilns are using slag coal and other indigenous fuel which work with natural up-draught and down draught having fuel efficiency in the range of 18 to 23 per cent and are bound to emit a lot of pollution in the form of Hydro Carbon monoxide, Sulphur Components and unfired Carbon particles. He has also observed that people are becoming conscious of the evil effects of pollution. Different environmental conscious NGOs, committees constituted by Government and other agencies have given much stress on pollution free technology. In this situation there is an urgent need for technological up gradation of brick industry.

John Mroszczyk (2009) focused that the safety engineering profession has the knowledge, skills, experience and insight to advance a national/global strategy to control hazards both inside and outside the workplace through engineering design. National Institute of Occupational Safety and Health (NIOSH) has a national Prevention through Design initiative aimed at reducing/eliminating workplace injuries, fatalities and disease. In addition, the Occupational Safety and Health Act (OSHA) Alliance Program has been working on Design for Construction Safety, an initiative to reduce construction injuries and fatalities through engineering design. The same safety engineering principles being promoted by these efforts can be applied to

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consumer safety as well. The most effective way to prevent injuries and fatalities in the workplace is to address hazards in the design phase. The design for safety process begins with an assessment of hazards and their associated risks. Once hazards are identified, the design for safety methodology is applied.

**Wilson (2005)** observed that safety training may range from a class room presentation to online or workplace training. One new type of safety training focuses on almost entirely on human factors. Human factors theory focuses on limiting the probability of human error based on human work factors and increased risk of contact with hazardous conditions in the workplace.

1.2.3. Works related to Payment of Compensation

**Roy Lewis and Geoff Latta** examined compensation for industrial injury and disease, and focused the main sources of compensation for industrial injury; the State’s industrial injuries schemes, occupational sick pay and common law damages. According to them, state benefits provide compensation for injury, disablement and death, but impose a narrow definition of accidents and disease. State benefit payable during absence from work is envisaged at 90 per cent of average post-tax earnings, with the employer legally obliged to pay no less than the equivalent amount for the initial period of absence. There would also be payments for loss of earnings after a man returns to employment, for non-pecuniary losses and to compensate the widows of those killed in industrial accidents.

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Ranjan Richa (2011) studied Comparative Analysis of Compensation Structure of H P C Ltd. Vis-à-vis Other Companies of Same Industry. After a careful study of the finding of this research we came to know following facts about Hindustan Paper Corporation Limited. They follow Graded Pay Structure from the comparison of Compensation Structure of all the three companies, HPC Ltd. has best basic pay structure, allowances and incentives schemes for their employees/ workmen. This analysis revealed that there is a big difference in ‘Per cent Range’ between the lowest and highest grades. HPC Ltd. is paying very good salary to its employees/workers as compare to other companies and it is more employees oriented, but it is time to become a production oriented company. It has to take some sincere steps to limit ‘Percentage to salary & wages to turnover’ to less than 10 per cent and to lower down ‘Employee cost/tonne’ otherwise, the salary and wages of the HPC Ltd. cannot be absorbed by physical and financial performance of the company.

Sherry I. Brandt-Rauf and Paul W. Brandt-Rauf (1988) examined compensation for occupational disease: hidden agendas. A worker sustains an occupational disease with a long latency period, the claim for compensation may come long after the product that occasioned the damage has been sold and perhaps long after it has ceased to be manufactured at all. Occupational disease is often unpredictable before the fact, and the relationship between workplace toxins and illness may be subtle and confounded by synergistic effects and multiple causes. Under these circumstances, the human and financial costs of disease will not be

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reflected in the immediate price of the product. This article has suggested that a compensation system is neither good nor bad in some abstract way. A federal super fund system may be an economically efficient way of handling the costs of occupational disease, but it may be grossly unfair, either to workers, to taxpayers, or even to industry. Likewise state workers’ compensation plans or reliance on litigation may make economic planning virtually impossible, at least in the case of disease, if not of injury

**Emmonst C. S. (Pat), (1960)**\(^{34}\) primarily considers the procedure relating to injury compensation as administered by the State Industrial Accident Commission. It reveals that the primary purpose for the creation of the State Industrial Accident Commission was to more fairly distribute the burden of caring for workmen injured in industry. To attain this purpose, the commission has been given general power to hold hearing and to make final decisions of both law and fact in all injury claims problems.

**Nathan Dev (2009)**\(^{35}\) examined many issues – those concerning compensation provision of social security, and reconstruction of the livelihoods for those who are displaced. It is observed that if social security were to play a role in sustaining the level of income of the displaced, then it must cover the gap between pre-displacement and post displacement income. For that the income level below which social security comes into play must be at least equal to the agriculturists’ pre-displacement income. One cannot expect a social security payment to permanently cover this difference, and the displaced may also not want to be in the position of


permanent social security benefit receivers, there are still two important roles that social security can play. First, as there is learning by doing in utilizing new productive assets, social security can help to cover the income gap during the learning process. Second, an assured minimum of income will enable the displaced to take up more productive but more risky investments. That is, it could reduce the extent of risk aversion of the displaced.

1.2.4. Works related to various Legislative Provisions on Industrial Accidents and Occupational Health Hazards

Ghosh Suparna and Nayan Barua (2009) highlighted the fact that although there are numerous labour laws like the Factories Act, 1948, the Minimum Wages Act, 1948, the payment of Wages Act, 1936, the Workmen’s Compensation Act, 1923 and the like, most of these laws don’t benefit the unorganized labourers who comprise almost 95 percent of the total labour force.

There have been pitfalls in the implementation of the different labour laws. The lack of participation and co-ordination on the part of the State Government is one of the major causes for this. The illiteracy of the labourers has also made them unaware of their rights and as such, they cannot fight against injustice done to them. The paper also highlights the presence of a large number of suspected illegal immigrants in the unorganized labour market in Assam, from the neighboring country of Bangladesh, who have created an upheaval in the entire socio economic and political scenario in Assam. They also highlighted the limited applicability of a few

Acts in the State through case study method. It is concluded that labour legislations in the absence of their proper implementation is not going to resolve the labour woes. The success of labour welfare can be achieved through the combined efforts of the Government, the judiciary, the people, media, NGOs and last but not least, the labourers themselves.

Patil et al (2009) covered the unorganised sector and argued in favour of umbrella legislation for ensuring minimum level of protection to the workers. They referred to the suggestions given by the National Commission on Labour (NCL) for improvement of the situation. Some of the suggestions given by NCL are:

i. The workers in the unorganized sector are recognized as workers and included in official survey.

ii. Every worker in the unorganized sector should be given an official identity card.

iii. Workers in the unorganized sector are entitled to protection and welfare not only because they are citizens, but also because they are the main contributor to the wealth of the nation.

iv. The most important intervention is improving the economic status of poor woman working in the unorganized sector.

It implies that right to work will have to be viewed as a necessary concomitant of the right of social security.

Pandit Kameshwar, et al (2009) argued in favour of reforming the labour laws. They have mentioned that the recommendation of the Second National Labour Commission (2002) is not yet under way with no concrete follow up due to some political compulsions. They have focused on different issues such as job protection and employment creation, upholding international labour standards and enforcing labour legislations, extending legal protection to the unorganized sector, improvement in living standards (decent life), linking wages to productivity, vocational training and skill development, development of work culture, trade union recognition, workers’ participation in management, and quality circles, social security benefits, including pensions, occupational health and safety and reforming labour law based on political consensus among different stakeholders. Actually, labour legislation in India is standing at the crossroads. The Government is expected to take steps to reform the essential labour legislations, keeping in view the development of the economy and the need for increasing the pace of economic growth.

Roy Sunita (2009) studied on impact of globalization and labour law. It is revealed that in the field of labour law, reconciling the competing interests of labour and capital, though not easy, has been scientifically done by the labour courts and industrial tribunals for the last 60 years. This is a rich inheritance, unparalleled in the world. According to her, the level of litigation in any country is a sign of the vibrancy of democracy. Litigation suggests that the citizens of the State are going to courts to fight for their rights, believing that the courts will do justice. Maintaining a balance

keeps these democratic aspirations alive and reinforces faith in the judiciary as well as in democracy in general. When courts lose that balance and one side perceives itself as being sidelined in the judicial process, people abandon the litigation arena and are to be found in courts only if they are dragged there by the other party. Litigation has dramatically declined in view of the sharp reversal of labour law jurisprudence, short sighted and hurtful judicial interventions themselves.

Saini S Debi (2009) examined different issues and was concerned regarding working of the Contract Labour Act. It has been found that the share of contract labour in wage employment is as high as 60 to 70 per cent as against the official claims of 15 to 26 per cent. It is well known that contract labour is highly exploited and their rights conferred by the Constitution of India and various labour laws are not enforced. The incidence of sham contract as envisaged by various decisions of the higher judiciary is very high. The findings of a recent study suggested that some of India’s key industries, cement, iron and steel, cotton textiles and jute, rely on contract labour for as many as of four out of every five workers. This research also reveals that in Gujarat, none of the contract workers surveyed received Employees’ State Insurance (ESI) coverage, though in West Bengal up to one in four did. The contract labour regulation have not been found effective, even in West Bengal, where contract workers are largely recruited and controlled via trade unions. The situation reveals a total crisis in the Indian Labour Law System, and something drastic needs to be developed as a social value.

It also focused on the changed attitude of the state agencies on issues of labour law enforcement. The paper uses secondary data and doctrinal reasoning to argue that there is a need for change in the framework of the Contract Labour Act 1970 (CLA) so as to check the rampant tendencies of the employers to employ contract labour in even its core activities mainly with a view to lowering the costs through exploiting the powerless workers. It cites the Andhra Pradesh and Gujarat amendments to the Contract Labour Act to be used as reference points for effecting changes in its framework. The law enforcement mechanism needs to be more involving and not just the labour department. We need committees on the pattern of the Bonded Labour System (Abolition) Act which is enforced by tripartite committees on the pattern of human rights enforcement.

Sebastian Gilbert (2009) while discussing various legislations on labour welfare also mentioned the need for reviewing the existing labour laws in the organised sector, and suggesting comprehensive legislative measures to ensure a basic level of protection to workers in the unorganised sector. The recent legislations in favour of unorganised workers and the self-employed may be considered to have been long overdue for the very legitimacy of the system. Neo-liberal reforms have created the material basis for greater unity amongst the workers in the organised and unorganised sector.

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Labour Bureau (2004)\(^{42}\) focused the recommendation of the Royal Commission on Labour in 1931. The commission pointed out the need for systematic collection of labour statistics and the adoption of suitable legislation enabling the Competent Authority to collect and collate information regarding the living, working and socio-economic conditions of industrial labour. Further the inflationary pressure during the early period of the Second World War gave rise to demands of workers for compensation in their wages necessitating setting up of machinery for measuring changes in prices. Accordingly, Government of India constituted and set up the Rau Court of Enquiry recommended compilation and maintenance of Cost of Living Index Numbers for measuring the rate of compensation to be paid to the workers for the rise in cost of living. As a result of this study Industrial Statistics Act 1942 was enacted to facilitate collection of statistics on (a) matters relating to factories and (b) certain specified areas of welfare and conditions of labour. Since then Labour Bureau has been engaged in collection, compilation, analysis and dissemination of statistics on different facets of labour at All India level.

1.2.5. Works related to Implementation and perception of different Provisions of Acts, Social Security Legislation and other related works

Majumder Rituparna (2009)\(^{43}\) studied the need for implementation of the laborer regulations with regard to the international labour standards in the garment industry. The primary data were collected from the government officials, members of

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labour organizations and unions, workers working in the factories, exports or factory owners, sub-contractors and other experts involved in the field of labour rights and regulation in the field of garment manufacturing. The study also made certain recommendations for implementation of International Labour Standard to bring about change in the lives of the workers.

**Naagarajan R. (2010)** examined the perceptions of informal sector workers towards the social security in Coimbatore District, Tamil Nadu. The study revealed that the extent of casualization in the urban informal sector was extremely high. An alarming proportion, that is 97 percent of the workers, was found to have been engaged on a casual basis. This acted as the most important factor for increasing employment insecurity among the workers. The study also revealed a high degree of health insecurity among the workers in the urban informal labour markets. Unhealthy and unhygienic production processes were the major contributory factors towards health insecurity. The absence of adequate health protection mechanisms compounded the health risks being faced by the workers. As regards income security, there is a perception among the workers that they face some kind of income security. If the high cost of living in Coimbatore town is taken into account, along with the average weekly income of the workers, then it can easily be concluded that they do not have a secure income to meet the minimum requirements of life.
Bhattacharjee Suchismita et al (2011) carried out a study on “Safety Improvement Approaches in Construction Industry: A Review and Future Directions.” They reviewed the major approaches that were implemented to develop occupational safety in the construction industry. The author analysed nine major prevailing safety improvement approaches in the construction industry such as i) personnel selection, ii) technological intervention, iii) behaviour modification iv) poster campaign, v) quality circle, vi) exercise and stress management, vii) near-miss accident reporting, viii) safety climate, and ix) zero injury technique and implemented the major approaches in the construction industry to improve safety. It has been found that traditionally the burden of ensuring safety of construction work site has been placed solely on the contractor. The contractor will always bear responsibility for construction site safety in this respect. The concept of Prevention through Design (PtD) also allows architects and engineers to contribute in enhancing site safety. As a consequence, accidents and hazards can be minimised or eliminated before the workers are exposed to them. While the role of contractors in ensuring the safety of workers is undeniable, researchers are of the opinion that ideal time to consider construction safety is during design phases. Considering the prolonged involvement from the phase of inception, architects and engineers can play important role in identifying and mitigating potential hazards to the construction workers. The new approach of preventing accidents and incidents through design has been recommended in this paper as the future direction of safety improvement in the construction industry.

Kumar Anil (2009)\textsuperscript{46} examined the perceptions of industrial workers towards the social security legislation in the industrial sector with reference to the Employees’ State Insurance (ESI) Act; 1948. The objective of the study was to analyse the level of satisfaction among workers with the following provisions of the Employees’ State Insurance Act.

i) Medical benefit provision,
ii) Sickness benefit provision,
iii) Disablement benefit provision,
iv) Dependent benefit provision, and
v) Funeral benefit provision.

A sample of 103 workers was taken from two districts of the state of Haryana, namely Gurgaon and Faridabad. The study reveals that only 41 per cent workers were found to be satisfied with the medical benefit provision, 60 per cent workers on sickness benefit provision, 25 per cent workers on disablement benefit provision, 26 per cent workers on dependent benefit provision, and 32 per cent workers on funeral benefit provision.

The author has pointed out that there is a need to bring changes in the management of various services provided under this act. Health services need to be managed in a professional manner. Existing hospitals and dispensaries need to be modernised further. The procedure of availing different benefit needs to be made easier.

Deboucha Sadek and Hashim Roslan (2011)\textsuperscript{47} studied a review on bricks and stabilized compressed earth blocks and observed that the process of manufacturing clay bricks requires high energy to burn and a huge quantity of CO\textsubscript{2} gas is emitted during this process. The alternative of clay bricks is stabilized compressed earth blocks. The benefits of stabilized compressed earth blocks include; uniformed building component sizes and reduction of transportation cost. The reduction of transportation time, cost and attendant pollution can also make compressed earth block (CEB) more environment friendly than other materials.

Saha Arpita (2009)\textsuperscript{48} has referred to the preamble of the Constitution of International Labour Organisation (ILO) and stressed the need for protection of workers against sickness, disease and injury arising out of their employment, pension for old age etc. Subsequently, the UN General Assembly, while adopting the Universal Declaration of Human Rights also recognized the right to social security. The paper examined the implementation of the various laws and doctrines providing social security in India, and suggested the need for changes in certain sections of the law. It also provides an analysis of empirical data gathered from a field study conducted in the cement factory plants of ACC Limited in the district of Bundi in Rajasthan.

Jha Praveen (2009)\textsuperscript{49} has mentioned different Regulations regarding labour and economic performance. In this context, economists in favour of labour institutions


argue that several regulations may fulfill important redistributive roles in a market economy, particularly from the point of view of vulnerable categories of workers and this may provide necessary insurance from adverse market outcomes. Provisions such as labour standards may create desirable pressures on the employers to focus on the enhancement of their labour productivity whether it is through training or technical innovations.

It reveals that Section 2 of this paper provides a critical examination of the theoretical arguments. The theoretical basis for the advocacy of blanket labour market flexibility is rather weak. Section 3, based on major cross-country empirical analyses that examine linkages between labour regulation and different aspects of economic performance such as employment, economic growth etc. substantiates it further. In this section, we also look at the relevant evidence, including the results of a couple of much talked about studies, on India and it appears that the claims advanced by the distortionists are often exaggerated or dubious. Furthermore, it clearly emerges that many of these empirical studies are methodologically and statistically, seriously flawed. Section 4 provides an account of the major labour laws in India, and this is followed by a review of the critical issues in the current debate on reforming such laws. This section closes with some lessons, which may be appropriate towards the reform of labour laws at the current juncture.
Modiyan, L. Manojkumar et al (2009) examined the Labour Regulation in India and outlined the aims and objectives of the International Labour Organization (ILO). They have also listed out the ILO conventions and recommendations. The primary goal of the ILO today is to promote opportunities for men and women to obtain decent and productive work, in conditions of freedom, equality, security and human dignity. The primary responsibility for ILO programmes and activities in a country was assigned to the Director of the ILO office responsible for that country. One of the major reforms initiated recently is the launching of the “Active Partnership Policy” (APP) which aimed at bringing ILO closer to its constituents. The APP provides an excellent frame-work for social dialogue and for working together with common understanding and consensus.

It has been found that labour reforms in India in the context of globalization are much desired but also feared and misinterpreted. Labour reforms are very sensitive subject in the Indian context of the ground realities of poverty, illiteracy, diseases, deprivation, exploitation and per capita income. Labour market reforms involve institutional innovation. These reform measures may create anarchic conditions in the labour market.

Pandey, Ashish Kumar (2009) touched the main purpose of social security measures. According to him, organized social security measures in a statutory form are only of recent origin. The Constitution of India recognizes social security as a fundamental right. The achievement of social security is measured in terms of a series

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of legislative enactments, starting with the protective measures enshrined in the constitution. In India, labour laws have been codified in consonance with the Directive Principles of the State Policy and thoughts of great leaders like Mahatma Gandhi, Pt. Nehru and Sardar Vallabh Bhai Patel, the universal declaration of Human Rights, and other principles recommended by the International Labour Organization from time to time. Some of the important labour laws relating to Social Security are as follows:

a) The Workmen’s Compensation Act, 1923,

b) The Employees’ State Insurance Act, 1948,

c) The Employees’ Provident Funds and Miscellaneous Provision Act, 1952,

d) The Maternity Benefit Act, 1961,


He has also mentioned salient features of some of the Social Security Acts in India. 

Srivastava and Sachdeva (2009) have mentioned different Acts related to labour welfare. They have also touched on the changing employment scenario in India in the days of globalisation. In the present day, a major shift is taking place in employment from permanent to temporary, and from casual to contract employment. This has weakened the collective bargaining machinery of labour. The voluntary retirement scheme has become one of the main instruments for reducing the workforce. Permanent workers in non-core activities are removed and contractual

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workers are hired, either through outsourcing work to other firms or direct recruitment.

The challenge before the Indian industrial regulatory system is to devise a framework, which combines the efficiency of the enterprise with the interests of the workers. The regulators need also to ensure an investor friendly environment. For this it is necessary to take a holistic view of labour market regulation.

Saha Dulal Chandra et al (2011)\textsuperscript{53} studied effects of stone crushing industry on Shorea robusta and Madhuca indica foliage in Lalpahari forest. According to them, one of the various causes of forest decline is certainly the industrial expansion and the resultant air pollution of anthropogenic origin. Gradual and extensive encroachment of the forest area by the quarrying (mining) and crushing activities of the naturally occurring stones since early 1960s is found in the district of Birbhum, West Bengal, India. Measurement of suspended particulate matter (SPM), dust fall and gaseous pollutants in ambient air was done. Heavy deposition of dust particles on leaf surfaces was noted. Various types of folia anomalies, both microscopic and macroscopic, were detected externally. Comparison of air pollution status and folia biochemical parameters with those recorded in a controlled forest was done along with study of spatial significance between polluted sites at Lalpahari with increasing distance from the source of pollution.

Garg Committee (1985)\textsuperscript{54} reviewed the safety measures taken by the chemical industries of Maharashtra confirms that almost every factory it inspected was deficient in some way or the other in safety measures. General Observation and Recommendations made by the committee include: (a) Operators should be adequately trained in handling abnormal situations in plant operations; regular refresher courses should be arranged. (b) Toxic gases in the factory’s environment should be continuously monitored. (c) Safety devices and instruments should be frequently inspected, tested and a record maintained. (d) Storage of hazardous intermediate products should be restricted to eight hours, and before any plant is shut down, all such intermediate products should be consumed. (e) Risk analysis should be carried out in all plants where hazardous chemicals are handled, and measures for containment identified in case of failure. (f) Factories should educate the surrounding populace on measures to be taken in the event of leakage of any hazardous chemicals or effluents. (g) All used containers and discarded plant equipment and pipelines should be made unserviceable by being disposed as scrap. (h) A safety plan should be devised for transportation of hazardous chemicals.

Pani Sankar (2010)\textsuperscript{55} examined a study on “Pollution being caused by stone crushing”. It has been found that 260 crusher units were found defaulter for non-compliance with sitting criteria in Jajpur district alone followed by khurda with 87


non-complied units. It is mandatory for all the existing and proposed stone crusher units to obtain consent to operate from the Orissa State Pollution Control Board under section 21 of the Air (Prevention and Control of Pollution) Act 1981. It was also recommended that Relaxation of siting criteria will legalise the illegal actions of stone crushers and will invite air pollution closer to habitation. In most of the states the siting criteria remains still harder and because the units are not complying with the siting criteria, change in siting criteria to suit the units will not yield betterment of environment. Also the previous action of Orissa State Pollution Control Board in issuing closure notice and sealing of the unit was upheld by Orissa High Court in its order dated 27th January 2009, hence the Pollution Control Board should not make its stand weaker by further diluting the siting criteria.

1.3. RELEVANCE OF THE STUDY

It is observed from the above cited review of literature that a good number of studies have been made on industrial accidents, occupational health hazards, labour legislation and its implementation and also the studies on brick and stone crushing industries, but no study was conducted on the state of implementation of the legislative provisions regarding prevention of industrial accidents and occupational health hazards in brick and stone crushing industries of Barak Valley, Assam.

The present study is the first attempt to examine the selected categories of brick and stone crushing industries in Barak Valley, Assam keeping in mind the objectives laid down for this purpose. This type of intensive study on the status of a particular class of people, workers of brick and stone crushing industries, is necessary for the Government and the policy makers to formulate policy for their socio-economic upliftment. Further, the present study will make a definite contribution to
the knowledge of exercise of relevant rules and regulation of people of the unorganised sector.

The present study may also draw a special attention of the social scientists and prospective research scholars taking up research projects on other issues related to brick and stone crushing industries. The findings of this study may be helpful to settle the industrial dispute arising from compensation claimed by the injured workers due to any industrial accidents and occupational health hazards. This will create a congenial atmosphere and improve the employer-workers relationship in the industry.

The success of any plan depends, to a large extent upon its proper implementation of laws, the rules and regulations in order to the plan and programme. This is also applicable for brick and stone crushing industries. The present research work has examined the status of implementation of various Acts related to brick and stone crushing industries. From the findings of the study, some recommendations may be put forward which can plug the loopholes of implementation. The inferences drawn from the study presumably act as a guideline for the policy makers with regard to their future course of action concerning the recording and implementing of the various provisions and guidelines framed by the Government regarding prevention of industrial accidents and occupational health hazards in both the categories of industries of Barak Valley.

Moreover, this study is also important from the point of view of recording and implementing the relevant provisions which are laid down in India Laws, Acts, Rules and Regulations, Government Guideline, and Notifications etc. in connection with the operations of brick industry and stone crushing industry. The data and information of the study have been covered a period of ten years from 2002-2003 to 2012-2013. The
study is also helpful not only for owners but also for workers in any types of unorganised sectors. This research work, therefore, may be adequate disclosure of information for implementation of provisions of the Environmental Acts which must be beneficial to all citizens in the country to live in pollution free environment.

1.4. CONCEPTUAL FRAME WORK

1.4.1. Accident

The expression “accident” has not been defined in the Act. It means any unexpected mishap, untoward event, or consequence brought about by some unanticipated or undersigned act which could not be provided against. The basic and indispensable ingredient of the accident is the unexpectation. Whether a particular occurrence is accident or not, it must be looked upon not only from the point of view of the person who causes it but also from the point of view of the person who suffers it. Although an accident means a particular occurrence which happens at a particular time, it is not necessary that the workman must be able to locate it in order to succeed in his claim. There would be cases, where a series of tiny accidents, each producing some unidentifiable results and operating cumulatively to produce the final condition of injury constitute together an accident within the meaning of this section.56

1.4.2. Industrial Accident

An industrial accident may be defined as “an occurrence which interrupts or interferes with the orderly progress of work in an industrial establishment” According

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to the Factories Act of 1948, it is “an occurrence in an industrial establishment causing bodily injury to a person who makes him unfit to resume his duties in the next 48 hours.” In other words, it is an unexpected event which is neither anticipated nor designed to occur. It is always sudden for a gradual process does not constitute an accident. Moreover, the event or occurrence should be something to which a definite time, date and place can be assigned. It must arise in the course of employment in a factory or an industrial establishment. However, self-inflicted injuries or injuries inflicted with the consent of a person cannot be regarded as accidents.  

According to Hennrich, “Accident is an unplanned and uncontrolled event in which the action of an object, substance, person, or radiation results in personal injury or the probability thereof.”

1.4.3. Industrial Injury

An industrial injury has been defined as, “a personal injury to an employee which has been caused by an accident or an occupational disease, and which arises out of, or in the course of, employment, and which would entitle such employee to compensation under the Workmen’s Compensation Act, 1923.”

1.4.4. Nature of Accident

The nature of an accident may vary from industry to industry. An employee may fall from a height while engaged on a particular assignment or he may be caught

59. Mamoria, op. cit. PP. 882
in a machine while working on it, or he may fall against a machine, or parts of a machine having a horizontal protruding motion may strike against him or explosives used carelessly may explode, and injure an employee. Such accidents may result in disablement or death.\textsuperscript{60}

1.4.5. Types of Accidents

Accidents may be of different types depending upon the severity, durability and degree of the injury. An accident causing death or permanent or prolonged disability to the injured employee is called ‘\textbf{major}’ accident. A cut that does not render the employee disabled is termed as ‘\textbf{minor}’ accident. When an employee gets injury with external signs of it, it is external injury. Injury without showing external signs such as a fractured bone is called an internal one. When an injury renders an injured employee disabled for a short period, say, a day or a week, it is a \textbf{temporary accident}. On the contrary, making injured employee disabled forever is called \textbf{permanent accident}. Disability caused by accident may be \textbf{partial} or \textbf{total}, \textbf{fatal} or \textbf{non-fatal}. No accident occurs automatically. Instead, certain factors cause accidents. It has been noticed that an accident does not have a single cause but a multiplicity of causes, which are often closely related.\textsuperscript{61}

The injuries of the accidents may be fatal or non-fatal. Fatal injuries mean injury resulting from industrial accident which caused death of the worker. Non-fatal injuries mean injury resulting from an industrial accident, which prevented injured worker from attending to the work for a period of 48 hours or more.

\textsuperscript{60} Ibid, PP.882
1.4.5.1. Disablement

The injury must have resulted either in the death of the workman or to his total or partial disablement for a period exceeding three days. Disablement may be temporary or permanent. The test of disablement is the reduction in earning capacity in relation to the employment in which the workman was engaged at the time the accident took place and it resulted in the disablement.\textsuperscript{62}

1.4.5.2. Partial Disablement

Section 2 (1) (g) of the Workmen’s Compensation Act, 1923, defines partial disablement. Such disablement is of two types:

(i) \textbf{Temporary Partial Disablement},

(ii) \textbf{Permanent Partial Disablements}.

The test of such disablement is the reduction in the earning capacity of the workman. If the earning capacity of a workman is reduced in relation to the employment he had been at the time of the accident resulting in such disablement, it is \textit{temporary partial disablement}. If the injury caused by an accident results in reduction of the earning capacity in respect of employment which the workman was capable of undertaking at the time of accident it is \textit{permanent partial disablement}. Any injury specified in part II of Schedule I shall be deemed to result in permanent partial disablement. Compensation under the Act is payable only if the injury caused by an accident results in workman’s disablement exceeding three days.\textsuperscript{63}


1.4.5.3. Total Disablement

Total disablement is defined in Section 2 (1) (1) of the Act. When a workman is incapacitated of doing any work which he was capable of performing at the time of accident resulting in such disablement, it is total disablement. Incapacity for all work is different from the incapacity for the work which a workman was doing at the time of accident. It is further provided in the Act that permanent total disablement shall be deemed to result from every injury specified in Part 1 of Schedule 1. It may also result from any combination of injuries in Part 2 of Schedule 1, where the aggregate percentage of the loss of earning capacity, as specified against those injuries amounts to one hundred per cent or more.64

1.4.6. Causes of Accidents in Industries

Accidents are usually the result of a combination of factors, each one of which may vary from situation to situation. This combination may be of unsafe acts and equipment, of people factors and conditions. It has been rightly said that an accident does not have a single cause but a multiplicity of causes, which are often closely related. Mamoria (1996) divided the causes of accidents into three broad categories: (i) Unsafe Condition (Work-related causes), (ii) Unsafe Acts, and (iii) Other Causes.

Industrial accidents accounted for 4,340 deaths during 2009, as reported by the Bureau of Labor Statistics. A host of causes created industrial accidents, and these causes can be placed into different categories.65

64. Section 2 (1) (1) of the Workmen’s Compensation Act, 1923.
1.4.6.1. Human Error

Most industrial accidents occur because of human error. A worker does not follow the proper safety procedures or is attempting to accomplish a task without the proper equipment. According to the Bureau of Labor Statistics, as of 2009, 74.8 percent of these injuries occurred in the service-related industry. Most of these injuries were caused because an employee worked on equipment without the proper tools, damaging the industrial equipment and creating a safety hazard.

1.4.6.2. Lack of Training / Training Facilities

Many industrial accidents occur because an employee is not trained properly on the use of the equipment or the safety procedures used during the operation and maintenance of the equipment. The manufacturing industry reported 4.3 industrial accidents occurring for every 100 workers during the 2009 work year. Most of these accidents occurred because of lack of training of the employee.

1.4.6.3. Manufacturing Defect

Industrial accidents also occur because of a manufacturing defect in a piece of equipment or material. During the course of manufacturing several quality-control steps are taken to ensure the equipment is within safety tolerances. Because most of these quality controls are handled by humans, there is a chance that a piece of equipment can have a defect that is missed during the process. The equipment is installed, operated and then fails, causing an industrial accident that can injure or even kill an employee.
1.4.6.4. Maintenance

One of the common causes for industrial accidents is improper maintenance and procedures or the lack of preventive maintenance programs. Equipment cannot run without having maintenance performed on a scheduled basis. Most equipment manufacturers publish a recommended preventive maintenance schedule for the equipment, but the companies and their maintenance personnel are responsible for carrying out these preventive maintenance programs.

Sheikh (1999)\textsuperscript{66} has mentioned some of the causes of accidents. These are as follows:

i) Some industries have inherent hazards such as mining, construction, transport, etc. These are accident prone industries. Slight mistake on the part of employee can become a cause of accident.

ii) Inadequate lighting, haphazard placing of tools and equipment’s etc. can cause collision resulting into a serious accident.

iii) Afternoon and night shifts are more accident prone than day shift.

iv) Slippery floors and staircase can cause serious accidents.

v) Excess noise, dirty environment, naked electric wires, fatigue, too low or too high temperature, humid atmosphere, etc. are also the causes of accidents in industries.

vi) Unsafe storing of materials, sharp edges, inferior and low quality machines, overloading, inadequate ventilation, nonuse of safety equipment’s such as shoes, goggles, gloves, hats, etc. can cause accidents.

vii) Pollution of any kind, uncovered, unfenced machines and equipment, excessive heat and dust are also the immediate causes of accidents.

viii) Defective handling of objects, defective use of tools and equipment, defective machines, gas, etc. can cause accidents.

ix) Human feelings and emotions or imbalance such as frustration, unstable mind, hostility, anger, depression etc. are also the causes of accidents.

x) Intoxication during work can cause accidents.

xi) Lack of knowledge, ignorance, lack of communication, lack of safety, training, defective plant layout etc. are the causes of accidents.

xii) The overconfidence of the employee in doing the work without proper safety measures may land him in trouble. Negligence, carelessness at work may also cause accidents.
At the workplace human and non-human factors can cause accidents. It is, therefore, necessary to take all essential steps and measures to prevent accidents and safeguard the interests of the organization, employees and society.

Causes of accidents\textsuperscript{67} identified in the reports of industrial accident occurred in factories are as follows:

Machinery moved by mechanical power, machinery moved not by mechanical power, transport whether moved by power or not, electricity, explosions, fire, gassing, multiplier metals and other hot or corrosive substances, hand tools, falling bodies, persons falling, stepping on or striking against objects, handling goods or articles, others.

1.4.7. Prevention of Accidents at the Workplace

The first fundamental for preventing accidents is “good house-keeping.” It is interesting that in this connection the company crystallizes both management’s responsibility as well as the employee’s responsibility in this behalf.\textsuperscript{68}

1.4.7.1. Management’s Responsibility is to

i) provide a safe place in which to work,

ii) lay down machinery and equipment in safe and efficient manner,

iii) provide necessary safety equipment and accessories to permit efficient work being done,

\textsuperscript{67} Labour Bureau. Ministry of Labour & Employment. 10.08.2011.

iv) keep adequate ventilation in all areas and operations,
v) provide good sanitation facilities,
vi) keep the plant in good repair and comfortable temperature, and
vii) see that the safety rules are being followed without exception by the employees concerned.

1.4.7.2. The employee’s part in ‘good housekeeping’ comes under the following two heads, namely:

i) Carefulness or safety habits by way of following safety instructions,

ii) Orderliness and cleanliness.

The industry believes in providing safety education particularly to the new employee. It should also be given to an old employee on a new job as well as an old employee on the same job. No new entrant must be permitted to work on a machine independently until he has been sufficiently trained in the safety procedures. Different kinds of safety equipment are also provided depending on the operations concerned. First-aid boxes, as required by the Factories Act, are also provided. Plant Safety Committees are also constituted to advise factory management on the ways and means of improving safety devices at the factory as well as in encouraging safety habits.

According to Heinrich, the indirect costs of accidents are on an average four times the direct costs. After careful study of 75,000 lost time accident cases from insurance files, he found that 98 per cent of the accidents were caused by either unsafe
actions or unsafe mechanical or physical conditions or both and that they could be prevented by correction of the unsafe acts and conditions.69

1.4.8. The Basic Theory of Accident Prevention

The Basic Theory of Accident Prevention may be briefly stated as:

1. Injury occurs only as the result of an accident,
2. An accident occurs only as a result of unsafe act or unsafe conditions or both,
3. Unsafe actions or unsafe mechanical or physical conditions exist only because of faults on the part of persons,
4. Faults of persons are inherited or acquired from the environment.

The reasons or causes for the faults are

1. Anatomical or physiological characteristics
2. Improper psychological characteristics,
3. Lack of knowledge or skill,
4. Improper mechanical and physical environment.

Thus, in every accidental occurrence, there is always a chain of events which occurs in a logical and fixed order. Each link in the chain is dependent upon the preceding link. This is known as the Heinrich theory of chain of injury occurrence.

According to Heinrich, Principles of Accident Prevention can be classified in three heads as under:

1. The creation and maintenance of interest,
2. Fact finding, and

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3. Action based on the facts.

The Five Steps of Industrial Accident Prevention Proposed by him are given below:

1. Organization,
2. Fact Finding,
3. Analysis,
4. Selection of Remedy, and
5. Application of Remedy.

Classification of Unsafe Actions under the following heads:

1. Operating without authority.
2. Operating or working at unsafe speed.
4. Using unsafe equipments, using hand instead of equipment or using equipments unsafe.
5. Unsafe loading, placing, mixing, combining, etc.,
6. Taking unsafe position or posture.
7. Working on moving or dangerous equipments, and
8. Failure to use safe attire or personal protective devices

The unsafe acts may be the result of lack of knowledge or skill on the part of the worker, certain bodily defects and wrong attitudes. It has been established that more accidents are caused due to improper attitudes than due to ignorance or bodily defects.
Some of the Wrong Attitudes are

1. Negligence towards use of safety appliances,
2.Absent mindedness,
3. Over confidence or temptation to show off,
4. Violent temper,
5. Nervousness,
6. Lack of interest in the job,
7. Disregard for safety of others, and
8. Fatalistic view of life.

Classifications of the Unsafe Mechanical or Physical Conditions are

i) Inadequately guarded or defective machines.

ii) Hazardous arrangements and processes.

iii) Unsafe illumination.

iv) Unsafe ventilation.

v) Unsafe dress or apparel.

vi) Unsafe methods, planning etc.

The Unsafe Conditions can be corrected by

i) providing proper guards to the dangerous part of the machines,

ii) removing defects from machines by regular and constant check-ups and inspections,

iii) maintaining proper plant lay-out and house-keeping,

iv) making provision for adequate lighting, and

v) preventing workers from working with loose clothes.
1.4.9. Definition and Concept of Occupational Health and Safety

Since 1950, the International Labour Organization (ILO) and the World Health Organization (WHO) have shared a common definition of occupational health. It was adopted by the Joint ILO/WHO Committee on Occupational Health at its first session in 1950 and revised at its twelfth session in 1995. According to this definition, "Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job.

The main focus in occupational health is on three different objectives: (i) the maintenance and promotion of workers’ health and working capacity; (ii) the improvement of working environment and work to become conducive to safety and health and (iii) development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings. The concept of working culture is intended in this context to mean a reflection of the essential value systems adopted by the undertaking concerned. Such a culture is reflected in practice in the managerial systems, personnel policy,
principles for participation, training policies and quality management of the undertaking.”

Occupational health and safety is a discipline with a broad scope involving many specialized fields. In its broadest sense, it should aim at

i. the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations.

ii. the prevention among workers of adverse effects on health caused by their working conditions.

iii. the protection of workers in their employment from risks resulting from factors adverse to health.

iv. the placing and maintenance of workers in an occupational environment adapted to physical and mental needs.

v. the adaptation of work to humans.

In other words, occupational health and safety encompasses the social, mental and physical well-being of workers that is the ‘whole person.’

1.4.10. Hazard

A hazard is any source of potential damage, harm or adverse health effects on something or someone under certain conditions at work. Basically, a hazard can cause harm or adverse effects (to individuals as health effects or to organizations as property or equipment losses). Sometimes a hazard is referred to as being the actual harm or the health affect it caused rather than the hazard. For example, the disease

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tuberculosis (TB) might be called a hazard by some but in general the TB-causing bacteria would be considered the "hazard" or "hazardous biological agent".  

1.4.11. Occupational Health Hazards

Occupational health hazards may mean (1) conditions that cause legally compensable illnesses, or it may mean (2) any conditions in the workplace that impair the health of employees enough to make them lose time from work or to cause significant discomfort. Both are undesirable. Both are preventable. Their correction is properly the responsibility of management. The basic principle applied is to "eliminate the danger at the source." This may involve

- Elimination of a hazardous substance;
- Substitution of a less hazardous substance;
- Modification of the process;
- Control of the danger at the source (e.g., local exhaust ventilation);
- Control of the danger in the workplace (e.g., dilution ventilation);
- Use of personal protective equipment (e.g., respiratory protection);
- Administrative controls (e.g., work schedules).

1.4.11.1. Dusts

Dusts are solid particles generated by handling, crushing, grinding, colliding, exploding, and heating organic or inorganic materials such as rock, ore, metal, coal, wood, and grain.\textsuperscript{74}

1.4.11.2. Fumes

Fumes are formed when material from a volatilized solid condenses in cool air. In most cases, the solid particles resulting from the condensation react with air to form an oxide.\textsuperscript{75}

1.4.12. Type of Occupational Hazards

An industrial worker can be exposed to certain occupational hazards. There are many causes for occupational health hazards that can be cited. Anything can cause occupational hazards as a result of wrong operation in wrong time in the work place. Occupational hazards in industries are unforeseen incidents that are not scheduled or planned and cause injury to employees. However, Khanka (2010) divided occupational hazards into four categories: (i) Chemical Hazards, (ii) Biological Hazards, (iii) Environmental Hazards, and (iv) Psychological Hazards.

\textsuperscript{74} Occupational Safety and Health Administration. United States, Department of Labor, Washington, Industrial Hygiene, Training and Reference Materials Library, Retrieved from http://www.osha.gov/

\textsuperscript{75} Ibid.
The following five types of hazards may be caused as occupational health hazards of employees or workers in industries depending upon their occupations:

1.4.12.1. Physical Hazards: Physical hazards may include the following classifications:

- **Heat and Cold**

  The common physical hazard in most industries is heat. The direct effect of heat exposure is burns, heat exhaustion, heat stroke and heat cramps. The indirect effects are decreased efficiency, increased fatigue and enhanced accident rates. Important hazards associated with cold are chilblains; erythrocyanosis, immersion foot and frostbite as a result of cutaneous vaso constriction.

- **Light**

  The acute effects of poor illumination are eye strain, headache, eye pain, lachrymation; congestion around cornea and the chronic effects on health includes "miner's nystagmus". Exposure to excessive brightness is associated with discomfort, annoyance and visual fatigue.

- **Noise**

  Auditory effects consist of temporary or permanent loss of hearing where as non-auditory effects include nervousness, fatigue, interference with speech etc.

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76. Vydyulashashi. (2012). *Occupational Hazards*. updated 10th February, Quality of Life and Wellness,
Vibration

Vibration affects hands and arms. After some months or years of exposure, the fine blood vessels of the fingers may be increasingly sensitive to spasm.

Ultra Violet Radiation

Occupational exposure to ultra violet radiation occurs mainly in arc welding. Such radiations affect the eye, causing intense conjunctivitis and keratitis.

Ionizing Radiation

Ionizing radiations are finding increased application in medicine industry. X-rays and radioactive isotopes are widely used. The radiation hazards comprise genetic changes, malformation, cancer, leukaemia, ulceration and in extreme cases, the death.

1.4.12.2. Chemical Hazards: Chemical hazards act in three ways:

Local Action

Some chemicals are absorbed through the skin and cause systemic effects. Occupational dermatitis are due to machine oil, rubber, x-rays, caustic alkalis and lime.

Inhalation: This acts in the following:

- **Gases:** Carbon di-oxide, carbon monoxide, cyanide gas, sulphur dioxide cause gas poisoning
- **Dusts:** Inorganic dusts such as coal dust, silica, asbestos, iron causes anthracosis, silicosis, asbestosis, cancer lung, siderosis. Organic dusts such as cane fibre, cotton dust, and tobacco, hay or grain dust cause bagassosis, byssinosis, tobaccosis.
- **Metals and their compounds:** This is due to various systemic effects caused by heavy metals like lead, mercury, cadmium, manganese, arsenic, chromium etc.

- **Ingestion**

  Occupational diseases may also result from ingestion of chemical substances such as lead, mercury, arsenic, zinc, cadmium, phosphorous etc.

1.4.12.3. **Biological Hazards**

  Worker may be exposed to infective and parasitic agents at the place of work. The occupational diseases include leptospirosis, anthrax, tetanus, hydatidosis, fungal infections etc.

1.4.12.4. **Mechanical Hazards**

  The mechanical hazards in an industry centre on machinery, protruding and moving parts are causing accidents. Around 10 per cent of accidents in industry are said to be due to mechanical causes.

1.4.12.5. **Psychosocial Hazards**

  The Psychosocial hazards arise from the worker's failure to adapt to an alien working environment. Frustrations, lack of job satisfaction, insecurity, and emotional tension and also poor human relationship are some of the psychosocial factors that determine the physical and mental health of the workers/employees. Psychosocial hazards may also increase from the cause of hostility, aggressiveness, anxiety, depression, alcoholism, sickness absenteeism. Psychosomatic hazards are fatigue, headache, and pain in neck, back, peptic ulcer, Hypertension and rapid ageing.
1.4.13. Causes or Reasons for Occupational Health and Safety

The Causes for Occupational Health and Safety\(^77\) are mentioned hereunder:

- **Moral:** Duty of reasonable care; unacceptability of putting health and safety of people at risk; society's attitude to moral obligations; making the moral case to senior management.

- **Legal:** The preventive (enforcement), punitive (through criminal sanctions), and compensatory effects of law.

- **Economic:** Direct and indirect costs associated with incidents and/or unhealthy workplaces and their impact on the organization (includes insured and un-insured costs).

   Occupational Hazards and Diseases benefit none. Hence, there is a need to cure, prevent and protect against them.

1.4.14. Protection against Hazards

   Industrial establishments can take two types of measures to protect worker’s health against occupational hazards\(^78\):

   I. Preventive Measures.

   II. Curative Measures.

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\(^77\). *Occupational safety and health.* From Wikipedia, the free encyclopedia. Retrieved [file://1:\industrial.htm]

1.4.14.1. Preventive Measures

These are based on the philosophy that prevention is better than cure. The preventive measures to protect employee against occupational health hazards may include

i) Pre-employment medical examination.

ii) Periodic post-employment medical examination.

iii) Removal of hazardous conditions to the extent possible.

iv) Surveillance of special classes of workers such as women workers and child labourers exposed to health hazards.

v) Emergency treatment in case of accidents.

vi) Education of workers in health and hygiene.

vii) Training in first-aid to workers.

viii) Proper factory layout and illumination.

ix) Proper effluent Disposal Treatment Plants.

x) Proper re-design of job to remove monetary and fatigue.

xi) Proper Scheduling of the work with adequate rest.

1.4.14.2. Curative Measures

The curative measures begin once a worker actually suffers from ill health or sickness or disease. The curative measures include the followings:


ii) Allowing the employee adequate period of convalescing and recuperating.

iii) Adequate compensation.

iv) Allowing the needed best medical treatment from outside hospitals.
After Hazards are identified, continuous reviews of the work environment and work practices are required to control or prevent workplace hazards. Some ways to prevent and control hazards:

- Regularly and thoroughly maintain equipment.
- Ensure that hazard correction procedures are in place.
- Ensure that everyone knows how to use and maintain personal protective equipment.
- Make sure that everyone understands and follows safe work procedures.
- Ensure that, when needed, there is a medical program tailored to your facility to help prevent workplace hazards and exposures.

After detection, all current and potential hazards must be prevented, corrected or controlled. Systems used to prevent and control hazards include:

- Engineering Controls
- Safe Work Practices
- Administrative Controls
- Personal Protective Equipment (PPE)
- Systems to Track Hazard Correction
- Preventive Maintenance Systems
- Emergency Preparation
- Medical Programs.

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1.4.15. Major Accidents occurred in the various Industries in India

The following are the various industries where major accidents\(^8\) occurred in different time:

- **Bhopal, December 1984:** In world’s worst chemical disaster, a methylisocyanate gas leak from the Union carbide plant in the city killed over 4000 people. Thousands suffered irreversible health damage.

- **Delhi, December 1985:** An oleum gas leak from the Sriram Foods and Fertilisers Plant in Delhi severely affected workers and those living in the neighbourhood.

- **Rourkela, December 1985:** Blast furnace accident in Rourkela Steel Plant. 18 workers affected.

- **Durgapur, June 1987:** Chlorine leak at Durgapur Chemical Factory created panic all around. Over 100 were affected.

- **Bombay, November 1988:** Fire at the Bharat Petroleum Refinery at Mahul, North-East Bombay, killed 32.

- **Ramagundam, September 1989:** Major gas leak at Fertilisers Corporation of India unit at Ramagundam, killed 7.

- **Nagothane, November 1990:** Explosion at the Indian Petrochemical, Nagothane complex, 35 persons killed, over 50 suffered 70 per cent burns.

- **Bombay, July 1991:** Accidents in a Hindustan Organic Chemicals unit near Bombay, kills 7 workers.

\(^8\) The Economic Times, November 8, 1992.
• **Gwalior, December 1991:** Blast at the Dyeing department of GRASIM unit at Gwalior. 14 killed and 22 severely injured.

• **Panipat, August 1992:** Ammonia leak at the National Fertilisers Plant, Panipat killed 11, many injured.

• **Kahalgaon, October 1992:** Boiler explosion in the National thermal Power Corporation (NTPC), 11 killed and several injured.

It is reported that in every twenty seconds of every working minute of every hour throughout the world, someone dies as a result of an industrial accident. Industrial accidents cause losses to the employees and organisations as well.

### 1.5. SCOPE OF THE STUDY

The study covers Barak Valley of Assam which comprises Karimganj, Hailakandi and Cachar Districts. Brick and Stone Crushing Industries are the purview of the Factories Act, 1948. For the fulfilment of the first objective of the present research work, i.e. to study the legislative provisions and its implementation regarding prevention of industrial accidents and occupational health hazards in Brick and Stone Crushing Industries of Barak Valley, thus the study is based on the Factories Act, 1948 and Environment Protection Act, 1986. The legislative provisions which are basically related for prevention of industrial accidents and occupational health hazards in brick and stone crushing industries are mentioned as under:

- Provisions Regarding the Safety of Workers under Factories Act, 1948
- Provisions Regarding the Health of Workers under Factories Act, 1948
- Provisions Regarding the Welfare of Workers under Factories Act, 1948
Provisions Regarding the Welfare and Health of Contract Labour under the Contract Labour (Regulation and Abolition) Act, 1970

Provision Relating to Hazardous Processes under a new Chapter by the Factories (Amendment) Act 1987 (Sections 41-A to 41-H)

The Sections contain certain provisions intended to ensure that the conditions under which work is carried on in the factories do not affect the health of the workers injuriously. The implementation of the relevant provisions of the Factories Act is for protection against industrial accidents and occupational health hazards of workers in both types of industries.

Apart from the various provisions regarding Safety, Health and Welfare of workers under Factories Act 1948, there are certain environmental acts which are imposed by Central Pollution Control Board of India and Ministry of Environment & Forests for protection of environment against pollution caused by brick and stone crushing industries. So, brick and stone crushing industries are also within the purview of Environment Protection Act 1986 and it is mandatory particularly for these industries to follow the rules enacted by the Pollution Control Board, Central and State of Assam.

The following acts are imposed by Central Pollution Control Board of India and Ministry of Environment & Forests to control the Air, Water and Noise Pollution and also to maintain pollution free environment.

- Air (Prevention and Control of Pollution) Act, 1981
- Environmental Protection Act, 1986
Noise Pollution (Regulation and Control) Rules, 2000
Water (Prevention and Control of Pollution) Act, 1974.

The study also covers the rules and guidelines framed by the Central pollution control Board of India and State Pollution Control Board of Assam for pollution control measures in brick and stone crushing industries. Therefore, the research work deals with the implementation of the relevant provisions which are applicable particularly for prevention of industrial accidents and occupational health hazards in brick and stone crushing industries.

1.6. OBJECTIVES OF THE STUDY

1. To study the legislative provisions and its implementation regarding prevention of industrial accidents and occupational health hazards in Brick and Stone Crushing Industries of Barak Valley.

2. To study the perceptions of the workers, and the employers/managers of Brick and Stone Crushing Industries with regard to the state of implementation of legislative provisions regarding prevention of industrial accidents and occupational health hazards in Brick and Stone Crushing Industries of Barak Valley.

3. To recommend the remedial measures, if so required, that could help in reducing/eliminating the possibilities of poor or non-implementation of legislative provisions regarding prevention of industrial accidents and occupational health hazards in both the Industries of Barak Valley.
1.7. HYPOTHESES OF THE STUDY

1. There is no significant difference between the perception of the workers and employers/managers of two categories of industries chosen for the study with regard to the state of implementation of legislative provisions.

2. The perception of the workers regarding implementation of preventive measures for protection against industrial accidents and occupational health hazards and the selected variables such as sex, age and education in both the industries under the study is independent.

1.8. METHODOLOGY OF THE STUDY

The study was carried out with the help of both primary and secondary data. The secondary data were collected and used in the form of existing legislative provisions regarding prevention of industrial accidents and occupational health hazards, different books, journals, periodicals, Government and Non-Government reports, judicial decision, statistical information, data available in different handbooks published by Government of Assam and India etc. as well as from relevant websites.

The primary data, on the other hand, were collected in the form of the opinions of the sample workers, and employers through questionnaires/schedules, specially developed for these two categories of industries chosen, on the state of implementation of legislative provisions regarding prevention of industrial accidents and occupational health hazards in Brick Industry and Stone Crushing Industry in Barak Valley.
There are 28 registered brick firms in Barak Valley, but 24 are presently functioning, out of which 10 firms are situated in Karimganj District, 06 in Hailakandi District and 08 in Cachar District.\textsuperscript{81} 50 per cent of the firms have been selected by using simple random sampling. Thus, 05 brick firms from Karimganj Districts, 03 from Hailakandi District and 04 from Cachar District have been selected for our study purpose.

There are some unregistered brick firms available in Barak Valley, out of which 08 have also been included in our study. Thus, 03 brick firm from Karimganj District, 02 from Hailakandi District and 03 from Cachar District have been chosen for our study purpose.\textsuperscript{82} Therefore, 20 brick firms have been selected for this research work. The selected brick units are shown for the present study in the following table no. 1.1.1.

\textsuperscript{81} District Industry and Commerce Centre, Cachar, Karimganj & Hailakandi Districts as in February, 2012
\textsuperscript{82} Field Survey, 2011-2012.
Table No.-1.1.1

Selected Brick Units (Registered and Unregistered) from three Districts of Barak Valley, Assam with year of establishment and man power employed in the unit for the Study

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name of Brick Units</th>
<th>Address of the Brick Units</th>
<th>Year of Establishment</th>
<th>Registered/ Unregistered</th>
<th>Total workers</th>
<th>Total Employers/managers</th>
<th>No. of Respondents from workers</th>
<th>No. of Respondents from owners/managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Ashok Bricks Industry</td>
<td>Mohonpur Road, P.O. SriKona, Dist. Cachar, Assam</td>
<td>2005</td>
<td>Registered</td>
<td>62</td>
<td>03</td>
<td>10</td>
<td>01</td>
</tr>
<tr>
<td>02</td>
<td>Barak Valley Bricks Industry</td>
<td>P.O. Kalain, Lakhipur, Dist. Cachar, Assam</td>
<td>1999</td>
<td>Registered</td>
<td>52</td>
<td>03</td>
<td>10</td>
<td>01</td>
</tr>
<tr>
<td>03</td>
<td>National Bricks Industry</td>
<td>P.O. Kalain, Dist. Cachar, Assam</td>
<td>2007</td>
<td>Registered</td>
<td>51</td>
<td>02</td>
<td>11</td>
<td>01</td>
</tr>
<tr>
<td>04</td>
<td>Baba Bricks Industry</td>
<td>Thambutilla, Barik Nagar (REC), Dist. Cachar, Assam</td>
<td>2005</td>
<td>Registered</td>
<td>53</td>
<td>03</td>
<td>10</td>
<td>01</td>
</tr>
<tr>
<td>05</td>
<td>Manasa Bricks Industry</td>
<td>P.O. Silcoorie, Dist. Cachar, Assam</td>
<td>2008</td>
<td>Unregistered</td>
<td>35</td>
<td>02</td>
<td>11</td>
<td>01</td>
</tr>
<tr>
<td>06</td>
<td>Ganesha Bricks Industry</td>
<td>P.O. Silcorie, Dist. Cachar, Assam</td>
<td>2000</td>
<td>Unregistered</td>
<td>37</td>
<td>03</td>
<td>10</td>
<td>01</td>
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<tr>
<td>07</td>
<td>Rahul Singh Bricks Company</td>
<td>Sildubi, P.O. Silcoorie, Dist. Cachar Assam</td>
<td>2001</td>
<td>Unregistered</td>
<td>80</td>
<td>02</td>
<td>10</td>
<td>01</td>
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<tr>
<td>08</td>
<td>Dhar Bricks Company</td>
<td>Patel Nagar Dist. Karinganj, Assam</td>
<td>1985</td>
<td>Registered</td>
<td>87</td>
<td>02</td>
<td>12</td>
<td>01</td>
</tr>
<tr>
<td>09</td>
<td>M/S. Roy &amp; Company</td>
<td>Karnamadhu, Katakal, Dist. Karinganj Assam</td>
<td>1984</td>
<td>Registered</td>
<td>71</td>
<td>02</td>
<td>13</td>
<td>01</td>
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<td>10</td>
<td>M/S. Roy &amp; Company</td>
<td>Patelnagar, Dist. Karinganj, Assam</td>
<td>1986</td>
<td>Registered</td>
<td>71</td>
<td>03</td>
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<td>01</td>
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<tr>
<td>No.</td>
<td>Company Name</td>
<td>Address</td>
<td>Year</td>
<td>Status</td>
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<td>60</td>
<td>03</td>
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<tr>
<td>11</td>
<td>Action Bricks Industry</td>
<td>Bannakandi, Dist. Karimganj, Assam</td>
<td>2007</td>
<td>Registered</td>
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<td>12</td>
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<tr>
<td>12</td>
<td>Delux Bricks Industry</td>
<td>Puamara, Kaliganj Road, Dist. Karimganj, Assam</td>
<td>2009</td>
<td>Registered</td>
<td>76</td>
<td>02</td>
<td>20</td>
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<tr>
<td>13</td>
<td>National Bricks Industry</td>
<td>Patel Nagar, Dist. Karimganj, Assam</td>
<td>2007</td>
<td>Unregistered</td>
<td>60</td>
<td>02</td>
<td>11</td>
<td></td>
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<tr>
<td>14</td>
<td>Mamon Bricks Industry</td>
<td>Sarif Nagar, Dist. Karimganj, Assam</td>
<td>2011</td>
<td>Unregistered</td>
<td>36</td>
<td>02</td>
<td>11</td>
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</tr>
<tr>
<td>15</td>
<td>Paul Bricks Industry</td>
<td>Telekalarpur, Kaliganj Road, Dist. Karimganj, Assam</td>
<td>2001</td>
<td>Unregistered</td>
<td>72</td>
<td>03</td>
<td>10</td>
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<td>16</td>
<td>Mohal Bricks Industry</td>
<td>Polarpur, Silchar Road, Dist. Hailakandi, Assam</td>
<td>1994</td>
<td>Registered</td>
<td>61</td>
<td>02</td>
<td>11</td>
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<td>17</td>
<td>Sourav Bricks Industry</td>
<td>Ujjan Kupa, Part-II, P.O. Hailakandi, Assam</td>
<td>2005</td>
<td>Registered</td>
<td>25</td>
<td>02</td>
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<td>18</td>
<td>Delux Bricks Industry</td>
<td>Bhowerghat, Lala Road, Dist. Hailakandi, Assam</td>
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<td>Registered</td>
<td>280</td>
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<td>12</td>
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<td>19</td>
<td>Chandra Bricks Industry</td>
<td>Ujjan Kuppa, Part-I, Dist. Hailakandi, Assam</td>
<td>2007</td>
<td>Unregistered</td>
<td>155</td>
<td>02</td>
<td>11</td>
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<tr>
<td>20</td>
<td>Model Bricks Industry</td>
<td>Chandrapur Road, Part-II, Dist. Hailakandi, Assam</td>
<td>2009</td>
<td>Unregistered</td>
<td>65</td>
<td>02</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Manpower/Respondents</td>
<td></td>
<td></td>
<td></td>
<td>1489</td>
<td>47</td>
<td>230</td>
<td>20</td>
</tr>
</tbody>
</table>

(Source: District Industry and Commerce Centre: Cachar, Karimganj & Hailakandi District as in February, 2012 and also Field Survey as in November, 2012- March, 2013)
As regards stone crushing industry, there are 60 registered firms in Barak Valley, out of these 44 registered firms in Cachar District, 2 in Hailakandi District and 14 in Karimganj District; again by using simple random sampling 22 firms from Cachar District, 1 from Hailakandi District and 7 from Karimganj District have been studied. Thus, 30 stone crushing firms have been selected for this study in Barak Valley. The selected stone crushing units are shown for the present study in the following table no. 1.1.2.

Table No.-1.1.2
Selected Stone Crushing Units (Registered) from three Districts of Barak Valley, Assam with year of establishment and man power employed in the unit for the Study

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of Stone Crushing Units</th>
<th>Address of the Stone Crushing Units</th>
<th>Year of Establishment</th>
<th>Total Workers</th>
<th>Total Employers/Managers</th>
<th>No. of Respondents from workers</th>
<th>No. of Respondents from owners/managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>M/s. Monorama Stone Crusher</td>
<td>Pangram, P.O. Udarbond, Dist. Cachar, Assam</td>
<td>1990</td>
<td>14</td>
<td>03</td>
<td>04</td>
<td>01</td>
</tr>
<tr>
<td>02</td>
<td>M/s. Shyamananda Stone Crusher</td>
<td>Pangram, P.O. Udarbond, Dist. Cachar, Assam</td>
<td>2001</td>
<td>14</td>
<td>02</td>
<td>04</td>
<td>01</td>
</tr>
<tr>
<td>03</td>
<td>M/s. Jain Stone Crushing Industry</td>
<td>Mohonpur, Part-II, Katigara, Dist. Cachar, Assam</td>
<td>1998</td>
<td>14</td>
<td>02</td>
<td>04</td>
<td>01</td>
</tr>
<tr>
<td>04</td>
<td>M/s. Sayan Concrete Industry</td>
<td>Bhadurpur, Rongpur, Dist. Cachar, Assam</td>
<td>1997</td>
<td>07</td>
<td>02</td>
<td>04</td>
<td>01</td>
</tr>
<tr>
<td>05</td>
<td>M/s. Hindustan Concrete Industry</td>
<td>Rongpur, Dist. Cachar, Assam</td>
<td>2002</td>
<td>04</td>
<td>02</td>
<td>03</td>
<td>01</td>
</tr>
<tr>
<td>06</td>
<td>M/s. Mahabir Industry</td>
<td>Pangram, P.O. Udarbond, Dist. Cachar, Assam</td>
<td>2000</td>
<td>09</td>
<td>03</td>
<td>04</td>
<td>01</td>
</tr>
<tr>
<td>07</td>
<td>M/s. Ascent</td>
<td>Mohanpur, part-</td>
<td>2002</td>
<td>09</td>
<td>02</td>
<td>05</td>
<td>01</td>
</tr>
</tbody>
</table>

83. District Industry and Commerce Centre, Cachar, Karimganj and Hailakandi Districts as in March, 2012.
<table>
<thead>
<tr>
<th>No.</th>
<th>Company Name</th>
<th>Address</th>
<th>Year</th>
<th>Month</th>
<th>Day</th>
<th>Year</th>
<th>Month</th>
<th>Day</th>
<th>Year</th>
<th>Month</th>
<th>Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
<td>Stone Crusher</td>
<td>Il., Katigara, Dist. Cachar, Assam</td>
<td>2004</td>
<td>05</td>
<td>02</td>
<td>04</td>
<td>01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09</td>
<td>M/s. Popular Stone Crusher Industry</td>
<td>Pangram, P.O. Udarbond, Dist. Cachar, Assam</td>
<td>2005</td>
<td>12</td>
<td>02</td>
<td>04</td>
<td>01</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>M/s. Deep Stone Crusher</td>
<td>Bhadurpur, Rongpur, Dist. Cachar, Assam</td>
<td>1998</td>
<td>07</td>
<td>02</td>
<td>03</td>
<td>01</td>
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<tr>
<td>11</td>
<td>M/s. Sri Durga Stone Crusher</td>
<td>Pangram, P.O. Udarbond, Dist. Cachar, Assam</td>
<td>2004</td>
<td>06</td>
<td>02</td>
<td>04</td>
<td>01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>M/s. Classic Stone Crusher</td>
<td>Pangram, P.O. Udarbond, Dist. Cachar, Assam</td>
<td>2006</td>
<td>07</td>
<td>02</td>
<td>04</td>
<td>01</td>
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<td></td>
</tr>
<tr>
<td>13</td>
<td>A.B.C.I Construction Company</td>
<td>Pangram, P.O. Udarbond, Dist. Cachar, Assam</td>
<td>2001</td>
<td>10</td>
<td>03</td>
<td>04</td>
<td>01</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>M/s. Bhura Concrete Industry</td>
<td>Pangram, P.O. Udarbond, Dist. Cachar, Assam</td>
<td>2003</td>
<td>07</td>
<td>02</td>
<td>04</td>
<td>01</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>M/s. Midas Granites Stone Crusher</td>
<td>Pangram, P.O. Udarbond, Dist. Cachar, Assam</td>
<td>2003</td>
<td>10</td>
<td>02</td>
<td>04</td>
<td>01</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>18</td>
<td>M/s. Barun Enterprise</td>
<td>Bhadurpur, Rongpur, Dist. Cachar, Assam</td>
<td>1994</td>
<td>04</td>
<td>02</td>
<td>03</td>
<td>01</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>19</td>
<td>M/s. Bramaputra Concrete Industry</td>
<td>Gossaipur, Part-III, Rongpur, Dist. Cachar, Assam</td>
<td>2000</td>
<td>06</td>
<td>02</td>
<td>04</td>
<td>01</td>
<td></td>
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<tr>
<td>20</td>
<td>M/s. B.N.S. Enterprise</td>
<td>Bhuiya, Rongpur, Dist. Cachar, Assam</td>
<td>2006</td>
<td>10</td>
<td>02</td>
<td>03</td>
<td>01</td>
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<tr>
<td>21</td>
<td>M/s.T.N Concrete Industry</td>
<td>Bhadurpur, Rongpur, Dist. Cachar, Assam</td>
<td>2005</td>
<td>07</td>
<td>02</td>
<td>04</td>
<td>01</td>
<td></td>
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<td></td>
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<tr>
<td>22</td>
<td>M/s. A.B.C.I Infrastructure</td>
<td>Rongpur, Dist. Cachar, Assam</td>
<td>1996</td>
<td>14</td>
<td>02</td>
<td>06</td>
<td>01</td>
<td></td>
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<tr>
<td>23</td>
<td>M/s. Quality Stone Crusher</td>
<td>Sarif Nagar, Dist. Karimganj,</td>
<td>2004</td>
<td>12</td>
<td>03</td>
<td>04</td>
<td>01</td>
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<tr>
<td>No.</td>
<td>Company Name</td>
<td>Address</td>
<td>Year</td>
<td>Month</td>
<td>Day</td>
<td>Total</td>
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<tr>
<td>24</td>
<td>M/s. Eagle Industry</td>
<td>Assam</td>
<td>1994</td>
<td>04</td>
<td>02</td>
<td>04</td>
<td>01</td>
<td></td>
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<tr>
<td>25</td>
<td>M/s. Karimganj Concrete Industry</td>
<td>Assam</td>
<td>1993</td>
<td>26</td>
<td>03</td>
<td>07</td>
<td>01</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>26</td>
<td>M/s. Lokenath Concrete Industry</td>
<td>Assam</td>
<td>2005</td>
<td>06</td>
<td>02</td>
<td>03</td>
<td>01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>M/s. Associate Enterprise</td>
<td>Assam</td>
<td>1994</td>
<td>10</td>
<td>02</td>
<td>04</td>
<td>01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>M/a. Annapurna Granulators</td>
<td>Assam</td>
<td>2002</td>
<td>17</td>
<td>03</td>
<td>06</td>
<td>01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>M/s. A.R. Enterprise</td>
<td>Assam</td>
<td>2006</td>
<td>11</td>
<td>02</td>
<td>04</td>
<td>01</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>M/s. Rohit(Construction Industry)</td>
<td>Assam</td>
<td>2007</td>
<td>45</td>
<td>03</td>
<td>07</td>
<td>01</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Manpower: 326, 69, 125, 30

(Source: District Industry and Commerce Centre: Cachar, Karimganj & Hailakandi District as in March, 2012 and also Field Survey as in November, 2012-March, 2013)
This research work is conducted on 50 numbers of brick and stone crushing firms in Barak Valley, Assam. The perception and awareness of the workers has been studied by collecting relevant information by canvassing schedule among the 19.56 per cent of the total workers of the selected firms in both the categories of industries. Thus, it covered 355 workers out of 1815 workers of brick and stone crushing industries. The total workers of brick industry are 1489 and stone crushing industry is 326 workers. It also covered 50 employers/managers out of 116 i.e. 43.10 per cent of employers/managers of brick and stone crushing industries. There are 47 employers/managers in brisk industry and 69 in stone crushing industry.

Moreover, interview was conducted with the Officers/Executives of District Pollution Control Board, Officer, Factory Office, District Cachar, Karimganj & Hailakandi, Managers & staff, District Industry and Commerce Centre, Labour Officers/Inspectors and Medical and Health Officers of all the three districts to gather the rules and regulation and preventive mechanism and implementation of the legislative provisions regarding industrial accidents and occupational health hazards of all the two categories of industries chosen in Barak Valley. Data and information have also been collected by arranging interviews with the employers, dealers, technical experts and other related persons of the selected /chosen two categories of industries.

The collected data were tabulated and analysed by using different statistical tools like average, Z test, chi-square test etc. The diagrams were also used in order to make the data visible and attractive.
To analyse the perceptions, a Likert type five-point ranking scale which ranges for fully implementation of legislative provisions to not at all implementation of legislative provisions, has been developed and Z test has been conducted for testing the null hypothesis.

To find out association, if any, between the selected variables in the study such as age, sex and education and perception of the workers of all the two categories of industries chosen for the study towards the different provisions of Acts under study, the chi-square test has been used.

1.9. LIMITATIONS OF THE STUDY
The following are the limitations of the study:

1. As the selected industries fall in the unorganised sector, time series data regarding industrial accidents and occupational health hazards are not generally recorded by the owners.

2. Because of the sensitivity of legal information, there was no attempt to determine the actual implementation of all the provisions of laws which are basically related to prevent and control of industrial accidents and occupational health hazards in the selected categories of industries.

3. One important limitation of the primary data is that most of the workers are unaware of different laws which have been enacted from time to time for their safety and security, due to illiteracy and less education. Even they do not know their legitimate rights during the working hours in the unit. Though owners and managers
are educated but most of them are not adequate aware of the various legislative provisions relating to industrial accidents and occupational health hazards.

4. Another important limitation is related to memory bias of the owners/managers and workers. Owners are generally maintaining very limited record of their units in respect of accidents and health hazards of workers. Therefore, the information supplied by the illiterate and unaware respondents may suffer from the limitation of their memory. Hence, data and information cannot be expected to be completely free from memory bias.

5. The study does not cover financial matter, marketing sector, profit and risk, and other technical aspects of both the categories of industries.

6. One of the important limitations is that most of the brick units are unregistered because for setting-up of brick unit, registration is not mandatory. As a result, some unregistered brick units might have been dropped from the present study.

7. A further limitation of the study is that methodology used may not gauge the qualitative attributes of the respondents like educational and moral standards, social beliefs and legal bondages etc.

8. Moreover, the correctness of the findings of the study will be dependent upon the correctness of the responses made by the sample workers or employees, and employers or managers in Brick and Stone Crushing Industries in Barak Valley, Assam.
1.10. CHAPTER PLANNING

The framework of the study is organised as follows:

**Chapter-1: Introduction:** This chapter includes statement of the problem, review of literature that comprises the findings of some of the researches conducted on the matter till now along with the justification of undertaking. It also covers relevance of the study, the conceptual framework which includes the definitional and other conceptual parts of the study (matter), scope of the study, objectives of the study, hypotheses of the study, methodology of the study, limitations of the study, chapter planning.

**Chapter-2: Profile of Brick Industry and Stone Crushing Industry in Barak Valley:** This chapter provides an over view of the area of the study. It covers geographical location, administrative set-up, climate condition, demographic scenario, population by religion, education sector, medical and health sector, agricultural scenario, industrial scenario, transport and communication. It also highlights Profile of Brick Industry including brick manufacturing, brick units in Barak Valley, environmental impact in brick production, consumption of fuel and energy utilization in brick industry, resources utilization, potential sources of air pollution, creation of different types of pollutants, social impact in brick industry, employment and payment mechanism, types of brick kilns, location of plant and machinery, technology installation in brick industry, various sections of brick units, status of workers of brick industry, occupational health hazards/diseases caused by pollution of brick industry. This chapter also focuses on Profile of Stone Crushing Industry covering types of stone crushing industry, stone crushing units in Barak Valley, operations and
technologies of stone crushing units, types of raw materials and supply zones, stone crushing process and stone crushing plant in India, processing description of stone crushing units, emissions from stone crushing industry, various sections of stone crushing industry, health hazards/diseases caused by pollution of stone crushers.

Chapter-3: Legislative Provisions to Prevent Industrial Accidents and Occupational Health Hazards: This chapter deals with provision for prevention of industrial accidents in brick and stone crushing industries, implementation of the provisions for prevention of industrial accidents and occupational health hazards in brick and stone crushing industries in Barak Valley, provisions for prevention of occupational health hazards in brick and stone crushing industries, It covers provisions regarding the health of workers (Sections 11 to 20) under Factories Act, 1948, provisions regarding the welfare of workers (Section 42 to 50) under Factories Act 1948, provision relating to hazardous processes under a new Chapter by the Factories (Amendment) Act 1987. This chapter also deals with legal provisions for prevention of occupational health hazards-Environmental Protection Act, 1986, provisions for controlling pollution caused by brick and stone crushing industry, guidelines for controlling air pollution in brick industry, Assam Brick Kilns Establishment and Regulation Rules, 2013, implementation of provisions for prevention of accidents and occupational health hazards by the brick industry of Barak Valley, guidelines for controlling pollution in stone crushing industry, Assam Stone Crusher Establishment and Regulation Rules, 2013, implementation of pollution control measures (PCM) by the stone crushing units of Barak Valley, guidelines for controlling noise pollution in brick and stone crushing industry, guidelines for controlling water pollution in brick and stone crushing industry, The
Workmen’s Compensation Act 1923, The Employees’ State Insurance Act, 1948, disablement benefit, dependant’s benefit, injuries deemed to result in permanent total disablement, etc.

Chapter-4: Judicial Approach to Control Industrial Accidents and Occupational Health Hazards: This chapter concentrates on judicial response to brick industry, judicial response to stone crushing industry, judiciary interaction to industrial accidents, judicial inference to occupational health hazards, judiciary opinion for payment of compensation, evolution of liability rule and procedures, substantial justices, remedial measures, etc.

Chapter-5: Analysis of Data and Interpretation of Result: This chapter analyses profile of employers/managers in brick and stone crushing industries in Barak Valley, profile of workers in brick and stone crushing industries, perceptions of the workers and the employers/managers of brick and stone crushing industries in Barak Valley. It covers test of hypotheses, analysis of data regarding scope of improvement of legislative provisions in brick and stone crushing industries, analysis of data regarding accidents / injuries in brick and stone crushing industries, analysis of data regarding health hazards in brick and stone crushing industries, analysis of data regarding medical facility and insurance policy in brick and stone crushing industries, analysis of data regarding other supplementary matters in brick and stone crushing industries.

Chapter-6: Summary of Findings, Conclusion and Suggestions: This chapter contents objective wise summary of the findings, conclusion of the entire research work and put forward certain suggestions for remedial measures which can help to
strengthen the state of implementation of the legislative provisions regarding prevention of industrial accidents and occupational health hazards in brick and stone crushing industries of Barak Valley, Assam.

1.11. Bibliography.

1.12. Schedule for employers/managers as well as workers in brick and stone crushing industries.

1.13. Annexure