2.1. DEFINITION

2.1.1. OCCUPATIONAL HEALTH

Occupational health “is the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations by preventing departures from health, controlling risks and adaptation of work to people and people to their jobs,” (ILO/WHO1950 http://www.agius.com/hew/resource/ohsil0.htm)

2.1.2. OCCUPATIONAL HEALTH HAZARDS

Occupational health hazards “can be defined as hazards of exposure to pollution, noise, and vibration in the working environment” (http://stats.oecd.org/glossary/detail.asp?ID=1878).

2.2. TYPES OF OCCUPATIONAL HEALTH HAZARDS

Occupational health hazards are classified as Physical, Chemical, Biological, Mechanical and Psychological hazards.

Physical factors like temperature and heat are responsible for incidence of heat associated physical health hazards. The impact of heat stress in workers is directly proportional to the exposure period. Heat strokes and heat cramps are direct impacts of heat stress in occupants, whereas mortality and increased fatigues are indirect impacts of heat stress. Different industrial processes include heat emissions particularly cement, steel, oil refineries, textile and glass industries. Workers, who spent more time when working near boilers, stoves, kilns, oven and furnaces are more prone to heat stress (Ro-Ting Lin & Chang- Chaun Chan 2009). Heat stress may influence the worker’s efficiency as well as their health status (Ayyapan et al 2009).
Cold related occupational health hazards are prevalent in the workers of food processing industries, beverage industries, and cold storage factories. Sormunen et al (2009) stated that recurring of muscle and joint pains and intermittent respiratory symptoms are common in workers of cold storage factories. Noise is an inevitable physical hazard in industries. Dhere et al (2009). Exposure to noise leads to auditory and non-auditory effects (Mahendra Prashanth K.V. & Sridar Venugopalchar 2011). Mahendra Prashanth K.V & Sridar Venugopalchar also stated that heart related problems are the significant occupational health hazard noticed in workers exposed to excessive noise level.

People who are working in construction and transport sector are vulnerable to vibration hazards. Long-term exposure to vibration in workers leads to bone and joint pathological problems (Bongers et al 1988).

Food processing units, welding activities, hospitals, and chemical labs use radiation (both ionizing and non-ionizing radiations) for different purposes. Exposure to radiation, effect vision and occurrence of Conjunctivitis (Kolmodin et al 1988) and also cataracts (Hanke & Karsten 1990).

Chemicals play a crucial role in the industrial process. The contact of chemicals with skin (absorption) leads to the occupational skin problems like contact dermatitis, infectious skin diseases, fissured skin, ulcers, kallus (Karthik & Rajnarayan 2010) Eryhtmas and Skin lesions etc (Yamamoto et al 2001).

Inhalation of chemical pollutants like dust and fumes (organic and inorganic) from cement, ore, stone crushing industries, gaseous pollutants from oil and petroleum refining industries leads to the respiratory problems like discomfort in breathing, wheezing, cough etc (Zeyede et al 2010), (Manjula et al 2013).
Ingestion of chemical substances leads to occupational diseases. Pamela & Kyle (2005) identified that elevated blood Silver level, Argyrosis, Argyria, abdominal pain, severe respiratory and circulatory symptoms in silver processing workers.

The agriculture-related industries workers like crop farm workers, live stock farm workers, landscape workers and horticulture managers are exposed several respiratory disorders (Michalszczyrek et al 2011)

Anand Chand (2006) stated that “the absence of congenial environment, less pay, lack of positive feed back, job satisfaction, stringent industrial regulations and inhuman abuse are cause for psychological hazards in workers”.

2.3. OCCUPATIONAL HEALTH HAZARDS IN INDIAN CONTEXT

Until 1980 the government, the Indian government did not paid close attention towards occupational health. The view on occupational health and safety in India was changed after the occurrence of Bhopal gas tragedy in 1984. Then considering occupant’s health, the occupational health and safety were implemented in hazardous industries after the Bhopal gas tragedy.

2.3.1. BEFORE INDEPENDENCE

Prior to independence “39 inspectors for eight provinces with 8129 factories in 1929” and their duties include to record the industrial accidents and work place milieu. Provincial health services are used to convey public health excluding industrial workers until 1940. The labour investigation committee suggested that society should take care of medical services for hazardous and adverse employment.
2.3.2. AFTER INDEPENDENCE

After the independence few acts were enforced to protect workers like “Factories Act(1948), The Plantation Labour Act (1951), Dock Workers(safety and health welfare act 1986), The Building and other Construction Workers (regulation and employment and conditions and services Act 1996), Beedi and Cigar workers (condition and workers act 1996), Child labour (Prohibition and Regulation Act and Insecticide Act 1968), Mines Act (1952:1955), Mines rules (1957)”.

Ramanakumar.V.Agnihotram (2005) stated that “Recent industrialization and globalization are changing the Indian occupational morbidity drastically. Traditionally labor-oriented markets are on change towards more automation and mechanization, at the same time general awareness about occupational safety, occupational and environmental hazards are not spread in the society”.

2.4. OCCUPATIONAL HEALTH HAZARDS IN DIFFERENT SECTORS

No profession is occupational health hazard free and the intensity of hazard varies from profession to profession

2.4.1. OCCUPATIONAL HEALTH HAZARDS IN INDUSTRIES

Sang D.Choi (2015) reported that “Laborers, carpenters, iron workers and operators are more prone to risks”. Anamai Thetkathuek et al (2015) conducted studies on cold workers of frozen food processing industry revealed that “Ware house workers have abnormal symptoms than controls including repeated pain in musculoskeletal system, disturbances throughout the body, respiratory symptoms and episodic finger symptoms”. Olufunsho Awodele et al (2014) reported that “40 percent of painting workers do not use personnel protective equipments and 90 percent of the participants reported symptoms related to the
hazard exposure and also observed the significant concentration of metals in urine samples of painting workers against control group”. Somasiri Decharat (2014) noticed “A significant correlation between the airborne toluene exposure and hippuric acid levels in urine samples of paint workers at steel industries”. Abdolrasoul et al (2013) reported that “Most of the accidents occur in summer and 53.1% of accidents were occurred during shifts. Negligence of workers is the cause of 75% of the deaths and most of the injuries are electrical burns”. Eun-A-Kim et al (2012) summarized that “The mean diameter of rubber fume are (63-73nm) was larger than diesel exhaust (12nm) and outdoor dust (50nm). Seven sudden cardiac deaths were reported in shift working and overworking. Most of the cases had several non-occupational factors such as hypertension, overweight, and smoking”. Somsiri Decharat et al (2012) noticed “A statistically significant positive correlation was noticed between the air borne lead levels and blood lead levels(r=0.747, P<0.01). The behaviors like personnel hygiene, smoking habit and hand washing before eating or drinking had a significant correlation with blood levels” Dong-Hee Koh et al (2011) in their studies on link between cancer incidence and cement dust revealed that “There was an increased standardized incidence ratio for stomach cancer of 1.56 in production workers and concluded that hexavalent chromium is the causative agent for cancer mortality in workers”. Nicloe M.Gatto et al (2010) did literature review studies on meta analysis on stomach, colon, small intestine and rectal cancers on occupational exposures to hexavalent chromium concluded that “Chromium (Cr-VI)-exposed workers are not a greater risk of gastrointestinal cancers than the general population”. D.Boers et al (2010) concluded that “slight increase in risk of cancer mortality.” Ta-Yuan Chang et al (2009) reported that “Co-exposure to noise, DMF and toluene is associated with hypertension in the synthetic leather workers, and also simultaneous exposure to noise and mixture of organic solvents may have sub-additive
effect on the risk of hypertension”. Tomoko Ikeda et al (2009) reported that “Perceived lack of understanding from others with regard to health was the strongest factors associated with increased depressive symptoms, job future ambiguity, higher quantitative work load and being an employer or member of the employers family were additional factors associated with high depressive symptoms.” Dong-Hee Koh et al (2008) reported that “Asthma mortality was significantly higher and deaths from malignant respiratory diseases were high in dye industry”. Shanfa Yu et al (2008) concluded that “Independent effects of both job demand control model and effort reward imbalance model on well being. Future work should explore the combined effects of these two models psychological stress at work on health more thoroughly”. Masoud Neghab and Alireza Choobineh (2007) observed “The symptoms like regular cough, Phlegm, wheezing, shortness of breath, were significantly more prevalent among exposed workers in cement industry. They also concluded that exposure to cement dust is associated with respiratory symptoms and functional impairments”. Yoshihisa Fujino et al (2007) emphasized that “Hypertensive individuals with noise exposure at work should be regarded as a high risk group for intra cerebral hemorrhage”. Xianliang Wang et al( 2006) observed that “Nervous system impairments in welders could be attributed to occupational exposure of lead and Manganese, but not Cadmium”. Yung Ming Chang et al (2005) investigated that “No evidence that exposure to chlorinated organic solvents at electronics factory was associated with elevated human cancers”. Hsin –Yi-Lee et al (2005) concluded that “Job content, physical working condition, a harmonious interpersonal relationship at the work place and organizational problems were significant factors for musculoskeletal pains at upper extremity”.

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2.4.2. OCCUPATIONAL HEALTH HAZARDS IN HEALTH SECTOR

Basilua Andre Muzembo et al (2015) observed that “80.1 percent of health care workers had experienced one or more types of work place violence’s and overall, the severity of work place violence varied from verbal aggression and harassment”. Assadi S.N (2013) emphasized that “Clinical personnel are at higher risk for menses disorders compared with administrative personnel”. Caciari et al (2013) confirmed that liver parameters can be influenced on exposure to solvents”. Sacouche et al (2012) confirmed that “Due to repeated movements in lumbar flexion in sealing, raising the arms above shoulder levels in storage and transportation of loads in distribution of clean clothes leads to the principal complaints like back pain and shoulder pain among the workers in clothes central distribution service in a hospital” Gholamzadeh et al (2011) stated that “Problems related to physical environment, work load, dealing with patients and their relatives and handling their anger, being exposed to health and safety hazards, lack of support by the administration were the major stress factors identified in nurses who work in admission and emergency departments of hospitals”. Rajnish Joshi et al (2006) reviewed that “Incidence of TB disease in health care worker ranged from 69 to 5780 per 100,000 and they concluded that TB is a significant occupational health problem in health care workers from low and middle- income country workers”.

2.4.3. OCCUPATIONAL HEALTH HAZARDS IN AGRICULTURAL SECTOR

Kearney G.D. et al (2015) noticed that “Agricultural workers usually wear PPE when they work with chemicals but neglected during day light work”. Stoleski et al (2015) observed that “Cause effect association between the job exposures to respiratory hazards, and development of persistent airway obstruction among dairy farmers”. Starling et al (2014) emphasized that “A positive association was noticed between the specific organ
chlorines and diabetes”. Zukiewicz-sobczak WA et al (2013) observed that “Fungi like Aureobasidium pullulans and Alternaria alternata, Aureobasidium pullulans, Cladosporium oxysporum, are the biological agents causing respiratory diseases”. Wioletta et al (2013) emphasized that the “Farmers are not yet sufficiently covered by a system of detection, diagnosis and recognition of occupational diseases” and they suggested that to create awareness among the framers about protective measures by conducting awareness programs. Vyas (2012) identified that “The farmers were prone to severe low back pain while performing agricultural activities, weeding was the most stress nous activity for females” Solecki L (2012) reported that “Low part of the spine was the most often occurs in farmers in his entire occupational life and also this pain is permanent, radiating to one or both legs in farmers”. Narasimhan G et al (2011) stated that “systemic changes are required to improve the existing machinery safety practices through engineering, work methods and work practice modifications”. They also suggested that “occupational health and safety strategies should consider activities associated with hazardous situations to inform the content of injury prevention effects”. Pickett. W et al (2011) investigated that “Socioeconomic factors have been cited as most important risk factors for injury on farms” Abu Shama et al (2010) noticed the “High symptom prevalence’s for chronic cough, wheezing and breathlessness in farmers”. Beseler CI & Stallones (2009) revealed that “A significant association was noticed between the pesticide poisoning and respiratory symptoms in farm residents in Colorado”. Sosan MB & Akingbohungbe A.E (2009) assessed the occupational exposure hazards among cocoa farmers noticed that “Farmers used lindane, diazinon, endosulfan and propoxur for cocoa mirid control and the factors promoting for exposures in farmers are eating and drinking during spraying operations, failure to use protective clothing, improper storage and disposal of insecticides”. Thelin et al (2009) investigated
that “Farmers has lower risk of endocrine disorders, cardiovascular disorders and respiratory disorders”

2.5. OCCUPATIONAL HEALTH HAZARDS OF TEACHERS

People opt teaching profession assuming that they can lead tension free life. But in recent era, the teachers’ health is deteriorating due to modern education system and scanty availability of resources (Nooshin & Leila 2011).

Occupational health hazards of teachers can be categorized into the two major categories (Fig. 1)

1. Physical hazards

2. Psychological hazards
Fig. 1 Types of Occupational health hazards in teachers
2.5.1. PHYSICAL HAZARDS

Vocal problem is an important occupational health hazard in teachers (Smith et al 1998 & Leao et al 2015). The teaching profession demands the voice usage for prolonged periods and it also depends on working conditions (Munier & Farrell 2016), classroom acoustics (Jennifer et al 2015), and level of teaching (primary and secondary). For example a primary school teacher uses his/her voice continuously for an average of five hours a day, though the secondary school teacher uses his/her voice continuously for an average of five hours a day with intervals (Caitriona Munier & Ray Kinsella 2007).

Musculoskeletal disorders are the frequent occupational health hazard in teachers. Patience N Erick & Derek R Smith (2011) stated that “Frequent uses of head down posture such as frequent reading, Marking of assignments and writing on black boards are the causes for musculoskeletal disorders in teachers”. Other musculoskeletal disorders like upper back, shoulder, neck (Patience N Erick & Derek R Smith 2014) & Low back pain (Pengying Yue et al 2012) are in teachers. Profuse work tasks of a teacher which involves physical strain and also improper gestures while writing on the board are the key factors for incidence musculoskeletal disorders in teachers (Patience N Erick & Derek R Smith 2014).

Varicose veins are a known occupational health hazard noticed in teachers. Continuous standing and sitting for longer period of time are the factors causing varicose veins in teachers (Elaine Y.L.Chong & Alan.H.S.Chan.2010).

Respiratory ailments are also considered as common occupational health hazard in teachers. Discomfort while breathing followed by wheezing, intermittent Cough, Sputum etc are the respiratory symptoms noticed in teachers (Vaidya et al 2007). Kamini & Munira (2013) reported
that “teachers using chalk and board are at increased risk of developing pulmonary function impairments in teachers”.

Depanjan Majumdar & Prince william (2009) stated that “Chalk dust behave like any other particulate matter (PM)” and also the inhalation of particulate matter causes symptomatic problems like wheezing, runny nose, asthma in teachers.

Allergic contact dermatitis is a common occupational health hazard in teachers. The chalk dust that falls on teachers while scrapping the chalk on board is the root cause for incidence of allergic contact dermatitis in teachers(Fayez -Hassan 201,Maruthi et al 2016).Monica Corroza et al (2011) also observed that“Metals in the chalk cause professional direct eczema of hands and air borne periorbital dermatitis”.

The ambience of working environment plays a crucial role on teacher’s health. Even though the physical surroundings of the school is not detrimental as an industrial environment. Globalization demand for education and lack of resources is the prime reason for change of existing school infrastructure. Congested classrooms, improper ventilation, multistoried school building without lifts, limited number of toilets and without playgrounds are the cause for prevalence of ill health both in teachers and pupil.

Cleanliness in schools is an index of efficient housekeeping. It will also aids in achieving good working ambience as well as promotes hygiene. Poor maintenance of housekeeping in schools leads to unclean surroundings which influences the health of occupants of school(Naga Madhan mohan et al 2014).
Classroom architecture is a key factor for acoustics of classroom. If the classroom acoustics are improperly designed, the teacher has to strain his/her voice (Jennifer et al 2015). The noise generated from external and internal sources can have impact on hearing capacity of pupil. Thermal comfort describes “a person’s state of mind in terms of whether they feel too hot or too cold (http://www.hse.gov.uk/temperature/thermal/)”. Comfortable temperature of the classroom may improve performance of teachers as well as pupil (Richard Smith and Bradley 1994). Komalanathan Vimalanathan & Thangavelu Rameshbabu (2014) performed an fact-finding study on the impact of indoor temperatures on office workers and reported that “Indoor room temperature and illumination are can influence the performance of workers”. Improper postures and repeated work for longer periods also affecting teachers health (Pengying Yue et al 2012).

2.5.2. PSYCHOLOGICAL HAZARDS

Teachers are also vulnerable to psychological problems since long back (Clark Carlson & Thompson 1995: Joachim Bauer et al (2007) stated that “Verbal insults, deliberate damage of personnel belongings and threat of pupils are the reasons for the mental health problems in teachers”. Teachers efficiency is based on their individual capacity as well as working conditions (Justyna et al 2015). Mohan Galgotra (2013) carried out a study on high school teachers of Jammu, concluded that job satisfaction play vital role in mental health of teachers. Government school teachers having good mental health than private school teachers as they have congenial working atmosphere.