CHAPTER IV

REVIEW OF LITERATURE

Review of literature is an important part of the report, it lists the findings of the studies in the relevant field.

An overview of the available contemporary literature suggests that there is no available study on similar topics in the field of geography. A majority of the studies are in the medical field and they are related to the effect of occupation, chemicals or substances or the very process of the manufacturing on specific organs or organ system. These studies also state the effect of certain chemicals and their role as a causative factor of certain serious diseases.

Studies in Occupational Health:

The first comprehensive book on occupational medicine was published in 1700 in Italy by the "Father of Occupational Medicine", Bernardio Ramazzini (1633-1714). He inquired into the condition of work of different occupations on occupational health and wrote the volume entitled DE MORBIS ARTIFIOUM DIATRIBACA (treatise on the disease of Trademen). It contained accurate description of disease at work place due to many types of jobs, e.g., Chemists, Tinsmiths, Coopers, Cobblers, Wool workers etc. and many others, including even that of unemployed. In his behaviour towards working men,

Ramazzini's attitude was humane and sympathetic.

Emara et al (1971) in Cairo studied chronic manganese poisoning in the workers of the dry battery industry.An environmental study revealed a high concentration of manganese dust at the main working area. The study showed some association with the prevalence and the rapidity of effect on workers according to their occupation with the concentration of manganese dust in air.

A review of rheumatism in industry was done by Anderson (1971) in London. Sickness absence and premature retirement can be shown to result directly from rheumatic complaints, especially rheumatoid arthritis and disc-disease; furthermore, there seems to be a general agreement that sickness absence is more marked in heavy manual occupations than in light ones. Evidence supporting the view that the occupational factors are related to the aetiology of some chronic rheumatic diseases is fairly strong. Chronic tenosynovitis, bursitis, osteo-arthrosis, and to a lesser extent, disc-disease are among those in which such a relationship can be demonstrated.

Johnson and Wilson (1971) made an inquiry into the prognosis of oil dermatitis. It was also found that if the worker continued to be exposed to oil for more than 1 year after the onset of the dermatitis the chances of subsequent clearing were less than if the exposure was shorter.

Valic et al (1971) did a comparative study at respiratory function in female non-smoking cotton and jute workers. Cotton workers had a significantly higher prevalence of dyspnoea than jute workers. Among cotton workers 28.3% were found to have characteristic symptoms of byssinosis, whereas none was found among jute workers.

Miller et al (1971) investigated pulmonary function at rest and during exercise following bagassosis. In this study lung function and exercise responses were investigated in two groups of Indian bagasse workers to assess whether there were any permanent sequelae following regular exposure to bagasse dust in group of 12 men who had developed bagassosis and a group of 6 who had not.

Piotrowski (1971) in Poland, made an evaluation of the effect of exposure to phenol absorption of phenol vapour in the lungs and through the skin and excretion of phenol in urine. Volunteers were exposed to phenol vapour by inhalation and through the skin, respectively, and the excretion of phenol in urine was examined. The retention of the vapour decreased from about 80-70% in the course of exposure.The absorption of vapour through the whole of the skin was approximately proportional to the concentration of the vapour used.

Walker et al (1971), in London conducted a study of

bronchitis in men employed in the coke industry. Both the presence of bronchitis and employment in the environment of the coke-ovens had significant and independent effects on ventilatory capacity.

A study on nail damage in spray operators exposed to paraquat was conducted in Trinidad by Hearn and Keir (1971), they found nail damage in 55 workers, in a group of 269 spray operators due to contamination by diluted paraquat. It is emphasized that although the degree of contamination was usually gross, it is nonetheless important to recognize that the diluted material can cause nail damage.The commonest lesion was transverse white bands of discolouration and loss of nail surface, transverse ridging, gross deformity of the nail plates and loss of nails occurred.

Ghawabi (1978) studied the environment and the health of a working population exposed simultaneouysly to jute and hemp. Classical symptoms of byssinosis were not present but 7% workers complained of a typical tightness of chest. The prevalence of chronic bronchitis among the exposed workers was statistically significant, in comparison with controls. Effects of dust concentrations, age and duration of exposure on the prevalence of chronic bronchitis were studied. A closer analysis of the pulmonary function data showed that smokers and those with bronchitis have greater reductions in forced expiratory volumes at the end of the work shift than do other workers.

Kreyberg (1978) analysed the occurrence of lung cancer in nickel workers, particularly with regard to development time, histological types and tobacco smoking, in addition to specific exposure to nickel dust and fumes. It is confirmed that exposure to nickel dust and fumes increase the risk of developing lung cancer. Tobacco smoking is an important factor in the development of lung cancer in nickel workers.

Mustafa et al (1978) investigted byssinosis and other respiratory symptoms among workers in sisal spinning and workers in sisal brushing departments in Tanzanian sisal factories. It was concluded that a high prevalence of byssinosis associated with chronic and acute changes in FVC and FEV occurs in the brushing departments of sisal factories, and that this is related to lengthy exposure, high dust level and smoking.

Morgan (1978), in Oxfordshire conducted a study on industrial bronchitis. For many years, there has been much argument whether workers in the industry trades are prone to bronchitis. In 1966 the Medical Research Council issued a report of a Select Committee which concluded that occupationally induced bronchitis did not play a significant part in the aetiology of airways obstruction in dust-exposed men. Since then epidemiological studies have demonstrated that the prolonged inhalation of dust leads to an increase in prevalence of cough and sputum. Furthermore, new

physiological techniques have demonstrated a slight decrement in ventilatory capacity as a result of industrial bronchitis, and which is related to life time dust exposure.

Sakurai et al (1978) studied the health effects of acrylonitrile in acrylic fibre factories. It was found that slight liver damage may possibly occur in more highly exposed workers.

Langard et al (1980) conducted a study on the incidence of cancer among ferrochromium and ferrosilicon workers in Norway. They studied 976 workers who had a minimum of 1 year of exposure. The results of their study indicated that the increased incidence of lung cancer in the ferrochromium group has a casual relationship to occupational exposure. It is therefore concluded that the raised incidence of lung cancer is partly due to exposure to chromates.

An investigation of the acute behavioural effects of styrene on factory workers was conducted by Waldron et al (1980), A group of men exposed to styrene in a factory performed a series of behavioural tests at the beginning and end of their shift, and the results were compared with those of a referent group from the same factory. Changes in mood were noted in both groups of workers but were greater in the exposed men.

Noweir et al (1980) studied the role of family

susceptibility, occupational and family histories and individuals blood groups in the development of silicosis. Results of investigation of silicosis in 814 male workers exposed to silica-bearing dust showed that family susceptibility has an important role in the development of silicosis among examined workers, and workers whose fathers had an occupational history of exposure to silica-bearing dust were more resistent to the development of the disease than those with non-exposed fathers. The degree of consanguinity of parents, and individual's blood group, also have a role. It was found that the workers with the blood group "O" or 'AB' are more prone to silicosis.

A follow-up study was conducted on the incidence of cancer and the mortality in a cohort of 454 male workers producing vinyl chloride and polyvinyl chloride by Anderson et al (1984), the study population was restricted to employees with more than one year's work experience. Twenty three cases of cancer were observed, one case of liver cancer was found. Five cases of lung cancer and four cases of malignant melanoma of the skin were observed. The investigators suggested the possibility of a casual relationship between the exposure to vinyl chloride and the development of cancer.

Sorahan et al (1983) made a mortality study of nickel/chrome platers. 2689 workers were studied who had some period of chrome exposed employment. Significant positive

association was found for cancer of the lung and bronchus of chrome bath workers.

Shannon et al (1984), did a mortality study, with a historical perspective, at an insulating wood plant where the workers worked with glass fibre. A total of 2567 men who had worked for at least 90 days were studied. Eighty eight deaths were found in the 97.2% men traced.

The health effects of employment as a grain handler were studied by Broder et al (1984), the workers were examined on two occasions, firstly, immediately before or soon after they were hired and again about two and half months after they were employed. Over this time there was substantial increase in the prevalence of cough, sputum and eye irritation, accompanied by small pulmonary function changes suggestive of a restrictive ventilatory defect.

Johnson et al (1985) did a study on the respiratory abnormalities among workers in iron and steel foundry in Britain. The foundry workers had more respiratory problems. 4.8% workers had radiographic evidence of pneumoconiosis and 18.2% workers had asthma defined as the presence of bronchial hyper-activity, cough and additional respiratory symptoms such as wheeze, chest tightness or breathlessness.

Low and Mitchell (1985) conducted a survey in a steel foundry in Brisbane to evaluate the nature and frequency of

respiratory symptoms and to assess ventilatory functions. Of 46 workers exposed to moulding fumes and vapour, 23% workers had developed a wheeze while working in the foundry. Wheeze and other respiratory tract symptoms were often attributed by the workers to exposure to substances at work, particularly from the shell process.Symptoms were reported also, but less often, on exposure to materials used in the furnace process. Ventilatory functions studied over Monday and Friday showed small and inconsistent changes. Ventilatory function recorded before work on Monday morning showed no evidence of chronic airway obstruction in any group.

Rihimaki (1985) conducted a comparative study of concrete reinforcement workers and maintenance house painters on their back pain and heavy physical work.

Hendy et al (1985) studied an isolated case of a toolsetter developing asthma due to the oil mist generated by his lathe on which it was used as a coolant.

Berry, Newhouse and Antonis (1985) studied the combined effect of asbestos and smoking on mortality from lung cancer and mesthelioma in factory workers. But overall the evidence is that mesothelioma is independent of smoking.

Ong et al (1985) after a report in 1980, of the first three diagnosed cases and a preliminary epidemiological investigation that found little evidence of the disease,

conducted a survey aimed at determining the prevalence of byssinosis in Hong Kong. 1776 workers were studied using a standard questionnaire and portable spirometers. Only 2.7% of the mill workers had symptoms acceptable for a diagnosis of byssinosis. Another 10% workers had symptoms of chest tightness or breathlessness or both that were not related to the first exposure after a break and therefore did not fit the standard diagnosis.Some 14.5% workers had a chronic obstructive airflow disease but only 4.7% workers had chronic bronchitis. Job mobility and self-selection of sensitive cases out of cotton dust exposure seem the most likely explanations for the low prevalence.

A study of the recent cases of silicosis among jade workers in Hong Kong by Allan et al (1985), suggests that the source is the silica flour that was added in the polishing process. Five cases are described together with the result of environmental investigation in a workplace. In three cases the disease was of early onset, rapidly progressive, and presented the features of galloping silicosis noted in the other occupational exposures of silica flour. One patient had massive fibrosis; one case showed the evidence of active tubercular infection in addition to silicosis. It must be noted that the silica concentrations in the workplace during the period of study were well above accepted threshold limit values.

An inquiry into the relation between exposure to silica

dust, the presence of silicosis and progressive systemic sclerosis (PSS), was conducted by Sluis-Cremer et al (1985) on South Africa gold miners by case-control study. Seventy nine cases of progressive systemic sclerosis were matched by year of birth with an equal number of control miners selected randomly. Analysis showed no association between silicosis and PSS.

McLaughlin et al (1987) made a systemic assessment of the occurence of renal cancer among men in industries and various occupations. Data was separately analysed for renal and pelvic cancer. Significantly increased risks for renal cell cancer were observed for several professional and white collar occupations, including physicians and others in the health care industry. By contrast, the risk of renal pelvic cancer tended to be higher among blue collar workers especially in the machine industry. Deficits of both cancers occured among farmers.

Ratcliffe et al (1987) studied the semen quality in Papaya workers with long term exposure to ethylene dibromide, the study of semen quality was conducted on 46 men employed in the Papaya fumigation industry in Hawaii, with an average duration of exposure of five years. These data strongly suggest that ethylene dibromide may increase the risk of reproductive impairement in workers at exposure levels.

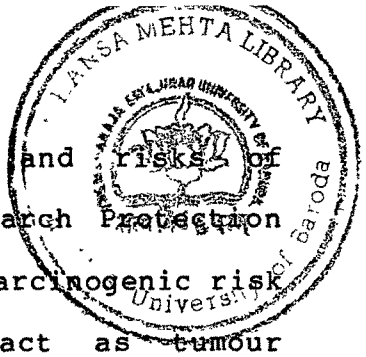
Medical, psychological and social factors associated

with back abnormalities and self-reported back pain have been investigated. A cross-sectional study of male employees in a Swedish pulp and paper industry, was conducted by Eastrand (1987), Factors associated with back pain and back abnormality were investigated. Multiple logistic regression analysis using data for manual workers showed that neuroticism and duration of employment were directly associated with back pain. The same two variables and low performance on one of the psychological tests were directly associated with back abnormalities.Age showed no direct association with back pain or back abnormalities. Strong associations between back pain and back abnormalities with both perceived health and general working capacity and the doctor's evaluation in the same areas were demonstrated.

Humphery (1991) published a book 'Looking after issues on health and fitness of industrial work force'.The content is comprehensive and covers a wide range of issues such as stress, health promotion at workplace importance of occupational health, nurses on work place etc.

Howard (1992) a wellknown Industrial relation consultant proved various areas of personnel management on occupational health practice in U.K.

In 'Health of the Nation' (Govt. U.K., 1992) it is emphasised that understanding of the interaction between



'health' and 'work', its complex nature and risks of employment is of prime. NRPB (National Research Protection Board, U.K. 1992) reviewed electro-magnetic carcinogenic risk of work force. Higher frequencies may act as tumour promoters.

David (1992) emphasized on the adverse effects of job-stress on heart disorders.

Mackie (1992) probed on 'work place and skin cancer which is tenth most common cancer in Scotland.

At the occupational health Nursing Conference (1993) it was discussed that management of occupational health hazard and safety needs a lot of inputs. The conference also emphasized on time to see roles of different functioning on occupational health.

Symington (1993), probed various areas of occupational health and need for cooperation from interprofessionalism to make occupational health related programme more effective and result oriented. He drew attention at the disadvantaged groups especially the small scale industries or business houses where health risks are higher.

Nattrass (1993) suggested on the guidelines for printing industry workers health and safety. He emphasized good health and safety.

Lurvey (1993) published a very significant material on health hazards of foundry workers.

Welch (1993) probed the hazard of work on lungs of sheet metal workers. Exposed workers were found to be suffering from pulmonary diseases, chronic bronchitis etc.

Stenlund (1993) worked on heavy manual works and its relation to workers' shoulder related health problems.

Newman (1993) studied the adverse effects of gaseous and components of diesal in causing 'Diesal Asthma'.

GEOGRAPHICAL STUDIES

There are some works on deficiency diseases of different regions (Khan, 1968, Hussain, 1968, Siddiqi 1972, Chouidula, 1973). Works directly on the effects climate and atmospheric pollution and occupational health hazards, so common in the west, are unusual in India.

The well established effects of environmental pollution on human health as a topic gained little attention from Indian geographers with some notable exceptions. Studies were made by Kumar (1980) on Kanpur, Singh (1981) on Moradabad city and Kayastha et al (1981) on health problems related to water supply in Varanasi district. A study of occupational

health hazards of leather and shoe workers in Agra (Singh 1981) provides most interesting vignette. Another on the potential health risks from faecal bacteria in the highly polluted Cooum river of Madras city may have wide relevance elsehwere in India (Asariah et al 1981).

China has published an atlas of cancer mortality (1981) illustrating that each cancer had its own distribution with relationships varying over the vast land mass and large population. Further, each map shows that the trends of cancer mortality in neighbouring regions between provinces were not influenced by man-made boundaries of administrative units, organisations of the survey of differences in diagnosis and treatment. This atlas also defines the extraordinary and fascinating patterns of Oesophageal cancer in China.

The earliest works in medical geopgraphy in India date back to the latter half of the nineteenth and early twentieth century and were concerned with the distribution and study of diseases on a descriptive basis. Medical topography in the northern part of India was studied by McCelland (1859), McNamara, Hamoston (1905) Chevers (1886), Adams (1899) and later are the works from southern India on public health at district scale. Hesterlow (1929, 1931-32), who is considered as one of the founding fathers of medical geography in India, worked at different regional levels, trying to correlate environmental factors with the incidence of various diseases. Work of cancer distribution appeared in the early medical

literature (Orr, 1933, Gault 1955, Sarma 1950). The association of the incidence of crime with local environment (Chopra 1942) and two books on health and nutrition in the Indian sub-continent (Gangulee, 1938, Broker 1957) suggest the divergent paths prior to IGU formation in 1948.

Developing the theme of Kendrick (1919) comprehensive analysis of climate, vegetation, tribal habitat and rice cultivation and their association with malaria were undertaken by Dutta, Akhtar et al (1980). In the unique ecology of Chandigarh Dun, where infectious diseases predominate, a spatial association with pathogenic, geogenic and cultural factors were studied by Jacques May, Mukherjee (1980).

National Research Council (Washington D.C. 1983) suggested stages of death hazards investigation:

1) Hazard identification
2) Exposure assessment
3) Dose response assessment
4) Risk characterization.

De and Gollelkeri (1990) studied the distribution pattern of pulmonary tuberculosis in Vadodara City. Their survey indicated that nearly 50 per cent of the affected persons were industrial workers, with poor incomes, living in overcrowded rooms.

Stock (1990) researched on disease and development - geographical perspective. Occupational health areas, viz., health problems of agricultural workers, noxious industries export to the third world countries, mines' health problems and health of migrant labourers, were investigated.

Wood (1990) undertook research on contagious Bocihe pleumo pneumonia in western Zambia. He emphasized on ecology of disease for successful control.

The review of literature presented above indicates that the workers in any industry have to face some kind of factor which may bring about ill-health. The nature of causative factor and duration of exposure, no doubt play an important role in bringing illness. Causative agents may be present in various forms such as chemicals, waste products, dusts, fumes, pollutants and overall environment. Most of the studies conducted are non-geographical. Very few geographers have attempted to correlate industrial environment with disease distribution. In India, such studies are particularly lacking. The only other known research on similar lines is that conducted by Stella Samuel who has studied the impact of industrialisation on the environment of Bangalore city. Her study, however, has not dealt with the infirmities encountered by the industrial workers.