

# **Disease and Health Condition of Tannery workers, Fish sellers, Mechanic workers and Cleaners in different areas of Dhaka City.**

A thesis report submitted to the department of Pharmacy, East West University, Bangladesh, in partial fulfillment of the requirements for the degree of M. Pharm in Clinical Pharmacy and Molecular Pharmacology

**Submitted by:**

Md. Mokhlesur Rahman  
2013-3-79-036

**Dissertation Supervisor:**

Farhana Rizwan  
Assistant Professor  
Department of Pharmacy  
East West University



Department of Pharmacy  
East West University

## **Declaration by the Research Candidate**

I, Md. Mokhlesur Rahman, hereby declare that the dissertation entitled “Disease and Health Condition of Tannery workers, Fish sellers, Mechanic workers and Cleaners in different areas of Dhaka City”, submitted by me to the Department of Pharmacy, East West University, in the partial fulfillment of the requirement for the award of the degree of M. Pharm in Clinical Pharmacy and Molecular Pharmacology (Masters) is a bona fide record of original research work carried out by me under the supervision and guidance Farhana Rizwan , Assistant Professor, Dept. of Pharmacy, East West University and it has not formed the basis for the award of any other Degree/Diploma/Fellowship or other similar title to any candidate of any University.

Place: Dhaka

Date: 06/08/2015.

Pharmacy

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Md. Mokhlesur Rahman

ID# 2013-3-79-036

Department of

**Certificate**

This is to certify that the thesis “Disease and Health Condition of Tannery workers, Fish sellers, Mechanic workers and Cleaners in different areas of Dhaka City”, submitted to the department of pharmacy, East West University in partial fulfillment of the requirements of the degree of M. Pharm in Clinical Pharmacy and Molecular Pharmacology was carried out by Md. Mokhlesur Rahman (ID# 2013-3-79-036) under our guidance and supervision and that no part of the thesis has been submitted for any other degree. We further certify that all the sources of information and laboratory facilities availed of in this connection is duly acknowledged.

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Farhana Rizwan  
Assistant Professor  
Department of Pharmacy  
East West University

## Certificate

This is to certify that the thesis “Disease and Health Condition of Tannery workers, Fish sellers, Mechanic workers and Cleaners in different areas of Dhaka City”, submitted to the department of pharmacy, East West University in partial fulfillment of the requirements of the degree of M. Pharm in Clinical Pharmacy and Molecular Pharmacology was carried out by Md. Mokhlesur Rahman (ID# 2013-3-79-036) under our guidance and supervision and that no part of the thesis has been submitted for any other degree. We further certify that all the sources of information and laboratory facilities availed of in this connection is duly acknowledged.

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Dr. Shamsun Nahar Khan  
Chairperson & Associate Professor  
Department of Pharmacy  
East West University

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## **Abstract**

The present study was designed to investigate the effect of chemical or metal on the physical health of the tannery workers, fish sellers, cleaners and mechanic workers in Dhaka city. Three hundred and fifty (100 tannery workers, 100 fish sellers, 51 cleaners and 100 mechanic workers) respondents were selected by purposive sampling method as samples for the present study. The main objective of the present study was to investigate the effect of work environment on the physical health of workers. The specific objectives were: (i) To investigate overall physical health of the tannery workers, Fish sellers, Mechanic workers and Cleaners. (ii) To investigate which disease and symptom is most prominent among them. For collecting data physical health questionnaires were applied on the respondents of the present research.

**Key Words:** Physical health, Chemical, Tannery industry, Fish sellers, Cleaners, Mechanic workers.

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# **Chapter One - Introduction**

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## **1. Introduction**

Different elements of environment such as soil, water, air etc. are polluted by industrial pollution. This pollution acts as a threat for the workers as well as for the general people who are living in this area. As a result some physical and mental health problems may be seen among them after working and living here for a long time.

### **1.1 General Introduction**

#### **1.1.1 Global hazard condition of Worker:**

About 45% of the world's population and 58% of the population over 10 years of age belong to the global workforce. Their work sustains the economic and material basis of society which is critically dependent on their working capacity. Thus occupational health and the well-being of working people are crucial prerequisites for productivity and are of utmost importance for overall socioeconomic and sustainable development. It is the objective of this Strategy that by the year 2000 the countries where trends in occupational health and safety are already positive, should demonstrate a further improvement of occupational health and safety indicators, showing a reduction of the difference between the level of health and safety of low-risk and high-risk occupations and enterprises. In countries where the present trends are still negative, positive development is expected and the legal and other actions, including the development of necessary resources and infrastructures, should be taken to make such positive trends possible. All countries should show a progressive development of occupational health services with the ultimate objective of covering all workers with such services

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irrespective of the sector of economy, size of company, occupation, mode of employment, or nature of self-employment. The workplace is a hazardous environment. Occupational health and safety hazards are common in many economic sectors and affect large numbers of workers. Approximately 30-50% of workers report hazardous physical, chemical or biological exposures or overload of unreasonably heavy physical work or ergonomic factors that may be hazardous to health and to working capacity; an equal number of working people report psychological overload at work resulting in stress symptoms. Many individuals spend one-third of their adult life in such hazardous work environments. About 120 million occupational accidents with 200,000 fatalities are estimated to occur annually and some 68-157 million new cases of occupational disease may be caused by various exposures at work. In addition to unnecessary human suffering, the costs involved in these health hazards have been estimated to amount up to several percent of some countries' gross national product (GNP). The most important challenges for occupational health by the year 2000 and beyond will be: occupational health problems linked with new information technologies and automation, new chemical substances and physical energies, health hazards associated with new biotechnologies, transfer of hazardous technologies, aging of working populations, special problems of vulnerable and underserved groups (e.g. chronically ill and handicapped), including migrants and the unemployed, problems related to growing mobility of worker populations and occurrence of new occupational diseases of various origins. In some regions and countries, only 510% of workers in developing countries and 20-50% of workers in industrialized countries (with a very few exceptions) have access to occupational health services in spite of an evident need virtually at each place of work. The need for occupational health services is particularly acute in the developing and newly industrialized countries (NICs). Furthermore, approximately eight out of 10 of the world's workers live in these

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countries. Such services, if organized appropriately and effectively for all workers, would contribute positively not only to workers' health, but also to overall socioeconomic development, productivity, environmental health and well-being of countries, communities, families and dependents. Also the control of unnecessary costs from sickness absenteeism and work disability, as well as costs of health care and social security can be effectively managed with the help of occupational health. Rapid change of the modern working life is associated with increasing demands of learning new skills, need to adapt to new types of work, pressure of higher productivity and quality of work, time pressure and hectic jobs and with growing psychological workload and stress among the workforce. Such developments require higher priority to be given for psychological quality of work and the work environment, and more attention to psychosocial aspects of work. (WHO, 1944)

### **1.1.2 The right to health at work**

Most of the world's population (58%) spend one-third of their adult life at work contributing actively to the development and well-being of themselves, their families and of society. Work may have either a positive or an adverse effect on the health of the worker. In the most favorable circumstances work provides the income and material outputs for meeting the necessities of life and also has a positive impact on social, psychological and physical health and well-being. At the same time, a high level of occupational health and safety contributes to the achievement of material and economic objectives and provides high quality and performance in working life. In spite of this, conditions at work and in the work environment for many occupations and in many countries still involve a distinct and even

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severe hazard to health that reduces the well-being, working capacity and even the life span of working individuals. (WHO, 2000)

**Conditions of work and the work environment may have either a positive or hazardous impact on health and well-being. Ability to participate in the working life opens the individual possibilities to carry out economically independent life, develop his or her working skills and social contacts. One-third of adult life is spent at work where the economic and material values of society are generated. On the other hand, dangerous exposures and loads are often several times greater in the workplace than in any other environment with adverse consequences on health.**

The officially registered working population constitutes 60-70% of the adult male and 30-60% of the adult female population of the world. When work at home and informal work are taken into consideration the percentage is even higher. In unfavorable cases the levels and intensities of hazardous exposures may be 10 or even 1000 times greater at work than elsewhere. Workers in the highest risk industries such as mining, forestry, construction and agriculture are often at an unreasonably high risk and one-fifth to one-third may suffer occupational injury or disease annually, leading in extreme cases to high prevalence's of work disability and even to premature death. Less dramatic but well-defined occupational health problems also prevail in service and office occupations where psychological stressors and ergonomic problems often increase the workload, cause job dissatisfaction and affect health and productivity. On the other hand, a number of studies have provided convincing evidence of a positive association between health, well-being, well-organized



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work and a healthy work environment where safety and health are considered and where conditions conducive to one's professional and social development are provided. It is universally accepted and confirmed in several documents by the United Nations, The WHO Global Strategy for Health for All by the Year 2000, the International Labour Organization (ILO) and others that every citizen of the world has a right to healthy and safe work and to a work environment that enables him or her to live a socially and economically productive life. Virtually all countries are still far from this objective, as evidenced by the high numbers of occupational accidents and diseases. Thus a new global strategy for health at work is very relevant to WHO and other organizations interested in dealing with workers' health issues. In spite of the great differences in levels of safety and health at work and the type and occurrence of occupational health problems, also a national strategy is needed in each country. Several sectors of society are involved in or have an impact on occupational health. Intersectoral and inter-agency collaboration is thus needed between various factors, such as employers, workers, governments and expert bodies at national level. At international level more collaboration in issues of occupational health is needed between WHO and other UN organizations such as International Labour Organisation (ILO), United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP), the World Bank and nongovernmental organizations such as International Commission on Occupational Health (ICOH) and International Occupational Hygiene Association (IOHA). (WHO, 2000)

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**According to the principles of the United Nations, WHO and ILO, every citizen of the world has a right to healthy and safe work and to a work environment that enables him or her to live a socially and economically productive life.**

### **1.1.3 The workplace and sustainable development**

In the declaration of the Rio Summit, sustainable development is defined as a strategy to “meet the needs of the present world population without causing adverse effect on health and on the environment, and without depleting or endangering the global resource base, hence without compromising the ability of future generations to meet their needs”. The Declaration further stated: “Human beings are at the centre of concern for sustainable development. They are entitled to a healthy and productive life in harmony with nature”. In terms of occupational health, the above principles mean the satisfaction of material needs through work and other production processes without causing danger to human health, the ecosystem, the resource base or the health of the community either in the short term or the long term. Occupational health is a basic element and constitutes a social and health dimension of the principle of sustainable development.

Occupational health is at the centre of sustainable development in the following ways:

- a) The prevention of occupational accidents, injuries and diseases and the protection of workers against physical and psychological overload imply a parsimonious use of resources, minimizing the unnecessary loss of human and material resources.

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- b) The objective of healthy and safe work environments call for the use of safest, low-energy, low-emission, low-waste (green) technology and in many countries occupational health legislation requires the use of the best available production technology.
- c) The occupational health approach has been shown to facilitate the undisturbed production that increases the quality of products, productivity and process management and thus helps to avoid unnecessary loss of energy and materials and to prevent unwanted impact on the environment.
- d) Many environmental hazards and burdens are derived from occupational settings, e.g. industry, agricultural practices or transportation and services. Experts and others responsible for occupational health and safety are well informed of processes and agents that may be hazardous to the environment and often this information is available to them at a very early stage of the problem, thus enabling primary prevention that is no longer possible once the hazardous elements are released into the general environment. The impact of occupational health on environmental protection in the case of problems derived from production systems is likely to be both effective and cost-effective. In many industrialized countries there are moves to make closer links between occupational health and environmental health approaches.

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- e) Occupational health services aim to ensure the health, safety, working capacity and well-being of the working population. A healthy, productive and well-motivated workforce is the key agent for overall socioeconomic development. Moreover, high-quality and productive work can ensure healthy production of materials, goods and services, and the consideration and practical implementation of the principles of sustainable development.
- f) Most environmental health hazards that have later been found to affect the health of the general population were first detected in the work environment and/or in the working populations. Thus the occupational environment provides an early warning system for certain environmental health hazards just as it also provides effective models for preventive action.
- g) For more than half of adults the work environment is the most demanding environment in terms of physical, chemical, ergonomic or psychological stresses and physical workload. The requirement of the Rio Declaration on healthy and productive life is particularly relevant to the work environment and calls for occupational health action.
- h) The state of the general environment and the ecosystem has an impact on the health of workers either indirectly or directly in several occupations of agriculture, mining, fishery and manufacturing. Thus, there is a two-way relationship between occupational health and safety on the one hand and environmentally sound sustainable development on the other.

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i) Equally important for personal well-being and for socioeconomic development of communities and countries is an employment policy that ensures access to work for everyone and enables individuals to sustain themselves and their families by their own work. Highest possible employment is also a key factor in the safe, stable and sustainable social development of countries while high unemployment rates and other associated problems endanger such development.

j) Particularly in developing countries the health and well-being of the family is critically dependent on the health and productivity of its working member, thus making several members of the community dependent on the health of the worker. In a situation where organized social protection is lacking, the loss of health, life or working capacity of such a key member of the family often means a severe crisis also for the rest of the family, affecting indirectly the well-being, health and economy of communities at large and of future generations.

**Occupational health is a basic element and constitutes a social and health dimension of the principle of sustainable development. Occupational health practices constitute a set of key activities for such development. (Rio, 2012)**

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#### **1.1.4 Trends of global economies**

The ultimate result of the work input of the global workforce is a total global gross domestic product (GDP) of USD 21.6 trillion per year (USD 9 160 per worker). This GDP provides the economic and material resources by which all other activities, including health and social services, training and education, research and cultural services, are sustained. In addition to these material and tangible values human labour is also behind most intangible assets of society such as level of education and general knowledge.

In 1990, about 6.3% of global GDP was produced by agriculture, 36.3% by industry and 57.4% by services. The shares of different sectors varied widely, however, so that the respective proportions were 3.6%, 36.9% and 59.5% in the most industrialized countries and 48.4%, 15.5% and 36.1% in the least developed countries. In the industrialized world a major part of both the workforce and the GDP is bound to services, in developing countries the greatest part of the workforce is employed in agriculture. Due to variations in the productivity of different sectors and different countries, the average GNP per capita varies by a factor of 12 between the counties with the highest income and those with the lowest. This has a major impact on the workload and standard of living of workers in different parts of the world. In recent years industry has been re-emphasized as the sector that produces the means to support other sectors such as services. Industrial productivity is often several times higher than productivity in agriculture. The world is still economically very diverse. In spite of distinct progress made by the economies of many developing countries, the difference: between the

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least developed and the wealthiest countries of the world did not reduce but actually widened during the 1980s. There are many signs that this development will continue during the 1990s.

**In spite of positive socioeconomic trends in some developing countries, the future development of international economies speaks for further diversification in different parts of the world and on different areas of economic activity. Along with such development, working condition! and occupational health and safety standards are at risk of becoming polarized.**

International economic and trade organizations predict further diversification of various economic sectors in different parts of the world in future. This will also have an impact on occupational structures and occupational health. The main recognized trends are growing internationalization, economic integration within the regions, such as North America, Europe and South-East Asia and growing competition between the regions. Slowing economic growth is expected in the industrialized world, while 3.4-5% average annual growth is expected in the rapidly industrializing developing countries particularly in South-East Asia and China (8% growth in 1993). Also foreseen are increase of productivity of agriculture in developing countries, increase in the role of industry in the lower and upper: middle-income countries, and decrease of the employment impact of industries and agriculture to the favor of the service sector in industrialized countries. However, among the least developed countries a clear regression is seen. The same is true in countries at war. Highly unstable and turbulent changes have been experienced in the recent past and are still likely to be seen in the economies of the countries of Eastern Europe, with distinct consequences on health and safety at work. There is a wide variation in economic structures, occupational structures conditions of work,

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quality of the work environment, and health status of workers in different regions of the world, different countries and different sectors of economies. There are also special occupational settings and types of enterprises, economic activities and undertakings in which world and workplace deviate substantially from the norm. Small-scale industrial and service enterprises often have few resources, heavy workloads and multiple tasks for one worker. Work takes place in an environment that does not always meet required standards. Family members of the workers and entrepreneurs, including children, pregnant women and elderly people, share the work in small-scale enterprises, home industries, small farms in all countries and cottage industries particularly in developing countries. In such situations most workplace exposures also affect family members and, since most of the time is spent in the combined home and work environment, the period of exposure also tends to be longer than the average. It has been estimated that two-thirds of the workers of the world still work in conditions that do not meet the minimum standards set by ILO. Because of the high prevalence of manual and heavy physical work combined with lack of coverage of general health and social protection, developing countries and the NICs have several needs if they are to develop occupational health services. These needs include the strengthening of infrastructures, training of human resources, and establishment of systems for registration of occupational injuries and diseases, establishment of institutes of occupational health, and establishment and updating of legislation and standards, as well as inspection of compliance with regulations. Due consideration should also be given to general health needs and to improvement of the health of the environment in these countries. Due to the major changes in social and economic systems in the heavily industrialized Countries of Central and Eastern Europe (CCEE), the infrastructures for occupational health have weakened during the past few years. This is a consequence of splitting the large industrial concerns with well-established in-



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plant services into smaller independent enterprises that are not always able to maintain the services. The need of the CCEE countries for technical assistance, consultations and training in reorganization of occupational health and safety activities has been recognized. There is also a need to strengthen preventive general health services for the working population. (WHO, 1994)

Advances in science and technology will lead to new developments in production systems. New information technologies, automation, further mechanization, new materials, growing production and use of chemicals, implementation of biotechnology on an industrial scale, low-impact processes, low-energy production and low-waste and recycling industrial strategies will have a great impact on production systems and the work environment in all parts of the economy, particularly in industrialized countries. This process of rapid change in production structures, often called the second industrial revolution, has a profound impact on conditions of work and on occupational health as well. Ensuring health and safety of workers as well as environmental health is key to the continued development of healthy new technologies.

**The second industrial revolution which results from wide implementation of new information technologies and automation, biotechnologies, new production methods and materials and the development of low-impact, low-energy and low-waste industry generally has a positive impact on occupational health and safety, particularly in industrialized countries. Some new problems of workers' health have, however, been identified. In addition, new patterns of employment and new types of work organization are seen. Ensuring health and safety in such changes is a key factor in determining their sustainability.**

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In many developing and NIC countries, social change is associated with a high rate of unemployment, active migration of rural people to urban areas, excessive urbanization with all its social problems and insufficient Government capacity to regulate urbanization and build up the required infrastructures for growing numbers of migrants. Workers seeking job opportunities in urban areas are often exposed to occupational and social hazards similar to those of workers in industrializing countries during the first industrial revolution 100 years ago and with similar severe impact on health and living conditions.

**Universal minimum standards are needed for health, safety and social protection of workers in all countries. In order to prevent social dumping and over-exploitation of workers who are not able to defend themselves, compliance with standards should be internationally controlled and should not be compromised for any reason.**

Growing economic competition has led some countries to compete, not only in the quality and productivity of work, but also by minimizing the costs of labour by paying less than reasonable minimum wages. At the same time standards such as those for occupational health and safety may be set far below those accepted in ILO International Conventions. Breaches of human rights, exploitation of unprotected workers, use of child labour, and high risks of health and safety are the consequences of such policies. Such social dumping has been found to be a vicious circle that has a 'counterproductive impact on sustainable development. Inhumane working conditions should be prevented by adopting and implementing a universal minimum standard for health, safety and other conditions of work that cannot be compromised anywhere. International mechanisms for control of such standards should be generated. The social dimension should be included as an essential part of

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all international, national and local regulations and policies. Some countries require that development aid and loans, particularly for the establishment of industries and other economic activities, should be conditional on inclusion of appropriate occupational health and safety elements in such economic programmes.

### **1.1.5 Demographic trends and working conditions of the global workforce**

About 2400 million (45%) of the total 5400 million population of the world and 58% of the population aged 10 years or more comprise the world's workforce (Table 1). If informal work and work at home is taken into consideration the proportion of the working population is even higher. Some 1 800 million (75%) workers live and work in developing countries and about 600 million (25%) in the industrialized world. By the year 2000 almost 8 out of 10 workers will be in the developing world.

Table 1. Working populations in the World in 1990 to 2000

Region	1990	2000	Growth 1990- 2000
Africa	230	302	31.3
Asia	1410	1646	16.7
Europe	380	400	5.3
South and Central America	158	199	25.9
North America	180	200	11.1
Total	2,358	2,747	90.3

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Numerous demographic changes are foreseen in the working populations of both developing and industrialized countries. The absolute number of workers will increase with almost 500 million by the year 2000 and 90% of that growth will take place in developing countries. This implies the need to produce some 500 million new job opportunities for young people. In addition there is a need to employ the current 820 million unemployed or partly employed persons. Unemployment is likely to be a major problem during the remainder of the 1990s. In view of supporting an individual's management of life by his or her own action, every adult citizen of the world should be given an opportunity to sustain himself or herself and the dependents with his or her own work. The present high global rates of unemployment deviate strikingly from such an objective. (WHO, 1994)

**It is estimated that the global workforce will grow by 500 million by the year 2000 requiring that new job opportunities be created for young people. In addition, employment must be organized for over 800 million people who are currently unemployed. This implies that the total employment shortage will be about 1-1.3 billion jobs by the year 2000. Unemployment is likely to remain a major long-term problem with adverse effects on health, working capacity and economy.**

Increasing rates of unemployment are expected because of the increase in productivity as a result of technological development, new divisions of work, high population growth and economic recession in different regions. Most agricultural and manufacturing processes will become less labour intensive, and services are not likely to absorb all the excess workforce no longer needed for primary and secondary production. Unemployment has been found to be associated with health hazards

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related to economic difficulties, major social problems, unfavorable lifestyles, risk behavior and psychological problems as well as, in some instances, higher mortality. The vast majority of the new jobs are needed in developing countries. Governments should carry out policies which enable every citizen of the world to have employment that corresponds to his or her capabilities and needs, and ensures reasonable income in healthy and safe working conditions. International economic organizations and the ILO have emphasized that the only way to respond effectively to such a vast employment challenge is the promotion of small-scale enterprises and self-employment. Dynamic changes are seen in the age structures of the working populations. Workers aged 60 years or more comprise 5.4% and 5.0% of the labour force in industrialized and developing countries, respectively. Adding those aged 50-59 increases the number of older workers threefold. A gradual increase in the average age of workers will be seen during the 1990s, particularly in the northern and Alpine areas of Europe. After the year 2000 more rapid aging of the workforce will take place also in many developing countries. In some industrialized countries the aging of the workforce and the simultaneous negative or zero growth of the population will lead to overrepresentation of the elderly and underrepresentation of the young. Due to growing average age of workforce and high accident rates in some countries the number of handicapped people will increase. According to the policies adopted internationally for handicapped persons the individuals with limitations in functional capacities have a right to participate in work provided their status of health permits it. Such individuals must be specially protected at work to avoid further loss of health and working capacity by adapting work and the work environment to their individual needs. Similarly appropriate services for rehabilitation and maintenance of their working capacity are needed. Much remains to be done to

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ensure equal opportunities for employment for underserved groups such as migrants, the handicapped, refugees and chronically ill workers.

**The major demographic trends worldwide are the increasing average age of the workforce, growing work participation rates, growing participation of female workers, growing mobility, increasing literacy, and level of education of the workforce. There are special problems of vulnerable and underserved groups such as child workers and handicapped people whose special needs should be appropriately considered in occupational health programmes.**

The growth of the older section of the workforce coupled with growing demands for better productivity will require measures to adjust working conditions to elderly workers, as well as resources to maintain and promote their health and working capacity. The average global labour participation rate in the formal workforce among the male workers is 73%, the respective figure for females being 43%. Female participation in the workforce varies widely from 60% in industrialized countries to about 10% in North Africa and Western Asia. The rate of female participation is expected to grow in the future. In 1985 women represented 36.5% of the world's labour force. There is a growing need to develop equality at work between male and female workers as well as to ensure equal job opportunities for both genders. To a great extent, the occupational health needs of about 100 million child workers in the world remain still unrecognized and the physical, mental and social development of these young individuals are likely to be affected. Drop-out from schooling may result in illiteracy while hazardous exposures and heavy workload present long-term health hazards to child workers. The number of the child workers between 10 and 14 years of age is difficult to estimate for

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individual countries. The numbers are declining in the industrialized countries although even their child labour is still used. About 5% of the workforces in developing countries are child workers, with up to 7.9% in Africa. Serious concern has recently been expressed about the unhealthy working conditions of child workers and about associated adverse effects on young people's health and physical, mental and psychosocial development. The number of young workers (15-24 years) is declining or will show decelerating trends due to falling birth rates and longer training periods in virtually all countries (with exception of certain developing countries). The decrease in the number of young workers will become even steeper after the year 2000. In spite of this, particularly in developing countries, young people have the highest risk of unemployment that prevents them from learning work practices and in a relatively short time affects their chances of ever finding employment. The illiteracy rate of the adult population in the world is at the moment 39%, i.e. about 960 million. As many as 95% of illiterates live in developing countries. The literacy rate is expected to grow worldwide to 72% by the year 2000, though a decline is expected in Africa and in some of the least developed countries of Asia. Enrolment rates for secondary and tertiary (university) education are growing and the differences between the developing and industrialized countries will grow less. Middle-income countries in particular will increase their average levels of education, while sub-Saharan Africa and the least developed countries elsewhere will continue to suffer from a shortage of people with higher education. This in turn will create difficulties in supporting socioeconomic and technical development because the capacity to absorb modern working methods and technologies is critically dependent on the availability of well-trained experts. While the improving educational level is likely to further the development of occupational health and safety, the

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shortage of higher education will negatively affect the development of occupational health in the least developed countries. (ILO, 1985)

### **1.1.6 Occupational health and safety**

The occupational health standards of workers and workplaces vary substantially according to economic structure, level of industrialization, developmental status, climatic conditions, and traditions in occupational health and safety. 20-50% of workers may be subject to hazardous exposures at work in industrialized countries and the rate may be even higher in the developing and newly industrialized countries. Mechanical factors and physical and chemical agents are the main problems in manufacturing industries, while pesticides, heavy physical work, organic dusts, biological factors and accidents are the occupational burdens of agricultural workers. A number of studies show that in the most unfavorable conditions 50-100% of the workers in some hazardous industries may be exposed to levels of chemical, physical or biological factors that exceed the occupational exposure limits applied in the industrialized countries. Because of the numerous problems of health at work and among working people, the need for occupational health is evident in all countries (industrialized, newly industrialized or developing) including the least developed ones. The types of problems may, however, vary substantially according to the national and local needs and conditions, cultural influences, and other local factors.

**Depending on the country, type of economic activity and enterprise, up to 30-40% of workers, and in some high-risk industries more than half of workers in some countries may be exposed**



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**to hazardous physical, chemical, biological or ergonomic factors that seriously exceed the exposure limits adopted for many industrialized countries. As a consequence, high proportions of workers may show adverse health effects from their workplace exposures.**

**Several recent surveys on psychological stress at work show increasing trends, particularly in industrialized countries. Such hazards have been shown to cause remarkable loss of health, well-being and working capacity and thus to affect the productivity, quality of working life, and economic status of individuals, companies and nations.**

The special occupational health problems of working women are recognized in both the developing and industrialized countries. In the former, heavy physical work, the double work burden of job and family, less developed working methods and traditional social roles are the factors that increase the burden of female workers. In the industrialized countries, where women also have the double work burden, lower-paid manual jobs are often left to female workers. Also the design of machinery and work tools are often made according to male anthropometry although female workers use such equipments. Women may also face problems of occupational exposures that are hazardous to reproductive health. In many service occupations the female workers may be exposed to the threat of violence from clients or to sexual harassment from fellow workers. Some studies indicate a higher than average risk of unemployment among low-paid female workers which may also have negative social and health consequences on families. Equal job opportunities for women and men and equal payment for the same job are still rarely seen around the world.

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High numbers of physical, chemical and biological agents, as well as adverse ergonomic, physiological and psychosocial factors are found in today's work environment. Such agents and factors, individually or in several complex combinations, threaten workers' safety and health and reduce well-being and productivity. Some hazards have been well identified while some others, such as health effects of non-ionizing radiations and indoor air pollution, still need research and scientific risk assessment. Occupational health problems caused by new developments in working methods, production technology and work organization should be foreseen and assessed early enough to undertake effective preventive action. In the past few years new infectious epidemics have threatened the health of workers, particularly those in the health services. Also some old infectious epidemics such as tuberculosis have re-emerged in many industrialized countries and continue to cause a health hazard to workers in health care.

#### **1.1.6.1 Mechanical hazards and accident risk**

Mechanical factors, unshielded machinery, unsafe structures at the workplace and dangerous tools are one of the most prevalent environmental hazards in both industrialized and developing countries and affect the health of a high proportion of the workforce. Hazards caused by traffic in many countries are starting to reach epidemic dimensions. For example, in Europe about 10 million occupational accidents, 25 000 fatalities and almost 150 000 fatal traffic accidents happen every year, a part of them being commuting accidents. There is a growing body of data showing that most accidents are preventable and that relatively simple measures in the work environment, working practices, safety

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systems and in behavioral and management practices are able to reduce accident rates even in high risk industries by 50% or more in a relatively short period of time. On the other hand, ignorance of such precautions, particularly in sectors where production has grown rapidly, has led to increasing rates of occupational accidents. Accident prevention programmes are an important and technically feasible part of occupational health services; they are shown to have high cost-effectiveness and yield rapid results.

#### **1.1.6.2 Major industrial hazards**

Though less frequent, major industrial catastrophes may cause great health losses and the workers are often the first and most severely affected victims. In a large-scale catastrophe the social, environmental and economic loss is so great that it is almost impossible to calculate. Many industrial catastrophes originate from technical failure, but human factors and the factors related to occupational health and the work environment often play a role. A predictive and preventive approach at the workplace, including adequate training in emergency response, may substantially reduce the potential for such hazards and the competence and knowledge of occupational health services should be used for this purpose. By limiting the risk of major accidents at the workplace it is possible to avert their consequences on the community and the environment.

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### **1.1.6.3 Physical factors in workplace**

Workers may be exposed to several physical factors such as noise, vibration, ionizing and non-ionizing radiations and microclimatic conditions which are known to affect their health. Between 10% and 30% of the workforce in industrialized countries and up to 80% in developing and newly industrialized countries are exposed to such physical factors and in some high-risk sectors such as mining, manufacturing and construction all workers may be affected. Noise-induced hearing loss has been found to be one of the most prevalent occupational diseases in both developing and industrialized countries. Numerous preventive means are available, including design of low-noise technologies and work methods, noise reduction at the source, enclosures, isolation of noise source, protection of workers' hearing by personal protectors and, if other methods are not available, shortening of the exposure times. Similar preventive strategies have been developed for other physical factors, particularly for localized vibration and ionizing radiation.

### **1.1.6.4 Chemical Factors**

About 100 000 different chemical products are in use in modern work environments and the number is growing constantly. Exposures are most prevalent in industries processing chemicals and metals, in the manufacture of several consumer goods (such as metal products and plastic boats), in the production of textiles and artificial fibres and in the construction industry. Chemicals are increasingly used in virtually all types of work, including non-industrial activities such as hospital and office work, cleaning, cosmetic and beauty services and numerous other services. The extent of exposure

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varies widely according to the industry, activity and the country. Fortunately only 1 500-2 000 chemicals are widely used, making assessment and management of risks easier, although not simple. Metal poisoning, solvent damage to the central nervous system and liver, pesticide poisoning, dermal and respiratory allergies, dermatoses, cancers and reproductive disorders are among the health effects of such exposures. In some countries more than half of the workers in certain high-risk industries may show clinical signs of occupational disease which also has an adverse effect on working capacity.

#### **1.1.6.5 Biological Agents**

Some 200 biological agents, viruses, bacteria, parasites, fungi, moulds and organic dusts have been found to occur in occupational exposures. In the industrialized countries around 15% of workers may be at risk of viral or bacterial infection, allergies and respiratory diseases. In many developing countries the number one exposure is to organic and biological agents. The Hepatitis B and Hepatitis C viruses and tuberculosis infections (particularly among health care workers), asthmas (among persons exposed to organic dust) and chronic parasitic diseases (particularly among agricultural and forestry workers) are the most common occupational diseases resulting from such exposures. The growing mobility of people from disease endemic areas to areas of low risk has increased the risk of disease, particularly to health care personnel. Immunizations can be used to control some hazards such as Hepatitis A and B, while for some others careful personal and occupational hygiene and use of personal protective devices or immunoglobulin's (Hepatitis C) may be the main preventive strategy. A new occupational health problem affecting health service workers and certain other groups is the reemergence of traditional epidemics of communicable diseases in, for example, Eastern

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Europe. The risk of occupational transmission of HIV to health care personnel has proved to be less probable than originally expected.

#### **1.1.6.6 Reproduction health hazards at the workplace**

Growing attention was paid in the 1980s to the risk from reproduction health hazards of work and workplace exposures. Some 200-300 chemicals known to be mutagenic or carcinogenic tend to have adverse effects on reproduction (including infertility in both sexes, spontaneous abortions, fetal death, teratogenesis, fetal cancer, fetotoxicity or retarded development of the fetus or the newborn). Numerous organic solvents and toxic metals are associated with adverse effects on reproduction health. Many biological agents, such as certain bacteria, viruses and zoonoses, as well as heavy physical work, are also associated with an increased risk of reproduction disorders. The reproduction hazards caused by ionizing radiation have been well established, while hazards from non-ionizing radiations are under intensive study. Both male and female workers may be affected by occupational hazards but particular concern is given to the protection of women of fertile age and during pregnancy. In addition to the conventional preventive actions of occupational health and hygiene services, special arrangements have been made in some countries to remove pregnant women from exposure that may be hazardous to the health of the mother or fetus. The modern occupational health approach considers the possibilities of primary prevention for protection of reproduction health of both genders in all stages of reproductive life of the worker.

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### **1.1.6.7 Occupational carcinogens**

About 300-350 different factors-chemical (e.g. benzene, chromium, nitrosamines, asbestos), physical (e.g. ultraviolet radiation, ionizing radiation) and biological (e.g. aflatoxins, tumor viruses) - have been identified as occupational carcinogens. The most common cancers resulting from occupational carcinogenic exposures are cancers of the lung, bladder, skin, mesothelium, liver, haematopoietic tissue, bone and soft connective tissue. Estimates for occupationally determined part of cancer morbidity out of the total cancer morbidity vary between 2% and 38%. Among certain occupational groups, such as asbestos sprayers, occupational cancer may be the leading factor in ill-health and mortality. Due to the special character of occupational cancer, the only effective strategy for its control is primary prevention that aims at total elimination of the exposure or at effective isolation of the worker from carcinogenic exposure.

### **1.1.6.8 High numbers of allergenic and fibrogenic factors at work**

There are estimated to be about 3000 allergenic factors in our environment, most of them occurring as occupational exposures. Allergic dermatoses are one of the most prevalent occupational diseases and can lead to incapacity for work and to the need to move the worker to another occupation. The respiratory tract, followed by the skin surface, is the most important route for hazardous agents to enter the body. This makes occupational respiratory diseases the priority problem in any occupational health programme. Occupational asthmas are caused by exposure to several organic dusts, microorganisms, bacteria, fungi and moulds, several chemicals, both organic and inorganic. The

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growing tendency of the population to develop an allergic response, coupled with high numbers of allergenic exposures at work and better diagnostic methods, has led to a steady growth in the registered numbers of occupational asthma cases in several industrialized countries. Again the primary prevention approach is the most important preventive strategy. In addition to respiratory allergens, the respiratory system may also be exposed to mineral dusts that cause fibrotic responses and are often associated with an elevated risk of cancer. Pneumoconioses have been found to occur in as many as half of workers most heavily exposed to silica, coal dust or to asbestos fibers. (WHO, 1994)

#### **1.1.7 Stress in the workplace**

Up to half of all workers in industrialized countries judge their work to be “mentally heavy”. Psychological stress caused by time pressure and hectic work has become more prevalent during the past decade. Other work factors that may have adverse psychological effects include heavy responsibility for human or economic concerns, monotonous work or that which requires constant concentration, shift-work, work under the threat of violence as, for example, police or prison work, and isolated work. Psychological stress and overload have been associated with sleep disturbances, burn-out syndromes and depression. There is also epidemiological evidence of an elevated risk of cardiovascular disorders, particularly coronary heart disease and hypertension. Severe psychological conditions (psychotraumas) may be seen among the workers involved in serious catastrophes or major accidents where human lives are threatened or lost.



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### **1.1.8 Work Psychology**

Strategies to prevent adverse psychological factors are directed towards the elimination of psychological overload and stress by modification of the work environment, work organization and, if necessary, by changing managerial systems. Prevention and control includes organization of teamwork, training and education, introduction of stress management methods for individuals at risk and psychological support from foremen, fellow-workers and psychologically competent occupational health services. Occupational psychologists also recommend increasing workers' self-determination and self-regulation as preventive strategies. In case of threat of violence, measures for eliminating the likelihood of such hazards (e.g. working in pairs instead of working alone) and provision of adequate protective structures and equipment for cases of emergency will improve worker confidence.

### **1.1.9 Social aspects of work**

Several social aspects of work may raise health concerns, for example, the gender distribution and segregation of jobs and equality at the workplace, social relationships between the managers and employees, and social support from fellow-workers are aspects of work that may enrich or reduce social contacts. In many services and public jobs the social pressure from customers, clients or the public may cause additional psychological workload. Measures for improving social aspects of work are mainly those that promote the creation of open and positive contacts at the workplace, support the individual's role and identity at work and facilitate team-work. Working conditions, type of work,

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vocational and professional status and geographical location of the workplace and employment also have a profound impact on the social status and social well-being of working people. Historically, occupational health programmes have been developed hand in- hand with the improvement of social conditions for underserved and unprivileged occupations and groups of workers. In many countries, social policy and coverage of social protection is closely linked with employment, and occupational health issues may be understood as part of the social component of collective agreements. As the mobility of workers increases and high numbers of migrant workers are found in several countries their health, well-being and social support requires special attention in which occupational health experts have a role to play.

**About 100 000 chemicals, some 50 physical factors, 200 biological factors and some 20 adverse ergonomic conditions, and an identical number of physical workloads associated with incalculable numbers and types of psychological and social problems have been identified as hazardous factors or conditions of work which usually occur in combinations and have several interactions. They contribute to the risk of occupational injuries, diseases and stress reactions, job dissatisfaction and absence of well-being. Most of such problems are in principle preventable and should be prevented in view of both interests of health and well-being, but also from the economy and productivity point of view.**

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### **1.1.10 Injuries, diseases and outcomes**

The ILO estimates that there are 120 million occupational accidental injuries and 200 000 occupational fatalities a year worldwide. This means the average risk of accidents is 42 per 1000 workers with the risk of fatality at 8.30/100 000. The European risk averages are 25/1000 for accidents and 6.25/100 000 for fatalities. Estimation of occupational disease rates is difficult because of the shortage of data and variation in the definition of an occupational disease in different countries. Extrapolation on the basis of incidence in the well-registered European countries (3-5/1000) gives a world annual incidence of 68-157 million cases of occupational diseases, of which about 30-40% may lead to chronic disease and about 10% to permanent work disability and, according to a crude estimate, about 0.5-1% to death. As indicated by WHO, in addition to formally registered occupational diseases high numbers of work-related diseases which are partially caused by occupational factors, aggravated by work or connected with lifestyles determined by work, occur among working populations. Globally, a major part of occupational diseases go undiagnosed and unreported. (WHO, 1994)

**120 million accidental injuries with 200 000 fatalities and 68-157 million cases of occupational disease are estimated to occur among the global workforce annually. In high-risk occupations one-fifth of the workers may annually contract an occupational accident or disease. Most of such morbidity is, in principle, preventable with the help of the modern occupational health approach. Many cases of occupational disease, however, go underdiagnosed and underreported and preventive actions are not undertaken.**

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In addition to occupational injuries and diseases, workers in developing countries suffer several maladies due to bacterial, viral and parasitic infections, malnutrition, poor hygiene and poor sanitation. Such conditions further reduce working capacity and aggravate the effects of occupational hazards. In some of the least developed countries the average manual worker in industry or agriculture may have several chronic infections. The average calorie supply of workers in the least developed countries is lower than what is needed to perform a full day of medium-heavy work (2400/kcal/d). The silicotic lung is more prone to contract tuberculosis, and lead exposure further aggravates anaemia caused by infections and malnutrition. Effects of many chemical exposures are aggravated by the poor nutritional status of the worker. The ultimate objective of occupational health is a healthy and productive worker, free from both occupational and non-occupational diseases. Occupational health also aims at the social and economic well-being of working people and promotes healthy, safe and motivating work and work environments. To achieve such an objective requires continuous improvement of the conditions of work and a comprehensive and multidisciplinary approach. Also the general morbidity of working populations should be considered. Particularly in developing countries and in small-scale enterprises the adoption of the primary health care approach may be needed to attain such goals.

**The ultimate objective of occupational health is a healthy, safe and satisfactory work environment and a healthy, active and productive worker, free from both occupational and non-occupational diseases and capable and motivated to carry out his or her daily job by experiencing job satisfaction and developing both as a worker and as an individual.**

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### **1.1.11 Low-risk and high risk jobs and workers**

The risk of occupational disease and accident vary substantially between different occupations. For example, in Finland there is a 30-fold difference in the occupational accident risk of low-risk and high-risk occupations and a 40-fold difference in the risk of occupational disease. Even in conventional production procedures, certain jobs are more dangerous than others. At the same time, socioeconomic characteristics and lifestyle may substantially increase the risk caused by occupational hazards. Lifestyle factors, such as tobacco smoking among asbestos-exposed workers, may substantially elevate the risk of occupational cancer. Identification of high-risk occupations and occupational groups is of great importance for focusing prevention and control and for setting priorities. Many high-risk groups consist of people of poor socioeconomic status, illiterate, earning low pay and with poor social protection. For example, migrant workers have a higher risk of occupational accidents than do workers from the host country. Migrants are not able to defend their rights or reduce their risks on their own; improvement of their health situation requires extensive and long-term commitment from the employers, authorities and health professionals.

### **1.1.12 Varying standard of health of working populations**

The health status of the working population varies greatly according to the general health situation of the country as well as the type of work and the standard of the work environment. Remarkable variation in the health of workers can be seen between the industrialized and developing countries. There are, however, also major differences in occupational health between countries with approximately the same level of socioeconomic development, demonstrating the importance of policy

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choices. Each country is, however, critically dependent on a healthy workforce and its capacity to produce raw materials, goods and services effectively. It has been shown that a high standard of occupational health and safety correlates positively with the GNP per capita in all groups of countries developing, newly industrialized and industrialized. On the other hand, loss of working capacity may cause great economic losses. Thus, hazardous working conditions are counterproductive to economic and social development, while a healthy, motivated and productive workforce in an optimal workplace is one of a country's most valuable social and economic assets. A growing body of data shows that the impact of occupational health is positive not only at the level of national economy, but also at the level of economy of an individual enterprise.

**A high standard of occupational health and safety correlates positively with high GNP per capita. The countries investing most in occupational health and safety show the highest productivity and strongest economy, while the countries with the lowest investment have the lowest productivity and the weakest economies. Thus, active input in occupational health and safety is associated with positive development of the economy, while low investment in occupational health and safety is disadvantage in the economic competition.**

#### **1.1.12.1 Low priority still for occupational health services in health policies**

Despite being important for national economies, the working population has seldom obtained a priority position on the health policy agenda either internationally or in many countries with great occupational health problems. This is so in spite of the fact that substantial economic losses are

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caused by health and safety hazards at work and by reduction or loss policies of working capacity. Such loss may amount to 10-20% of GNP in some countries. The low priority given to occupational health is all the more surprising in view of the fact that most occupational health hazards are preventable. The World Bank recently estimated that up to two thirds of occupationally determined loss of disability-adjusted life years (DALYs) can be prevented. Furthermore, besides minimizing health and economic loss by prevention and control of health hazards at work, occupational health can also improve productivity, contribute positively to the quality of products, and improve job satisfaction and work motivation. It has also been seen in developing countries where the coverage of social protection is low that the well-being of the whole family is critically dependent on the health and productivity of the working member.

**Poor occupational health and reduced working capacity of workers may cause economic loss up to 10-20% of GNP. According to the World Bank estimate, two thirds of occupationally determined loss of disability-adjusted life years (DALYs) could be prevented by occupational health and safety programmes.**

#### **1.1.12.2 Growing occupational health needs of developing countries**

The emerging occupational health needs of developing countries relate mainly to agriculture and other sectors of primary production. The role of the relatively small industrial manufacturing sector is vital to socioeconomic development. Pesticide poisonings, organic and mineral dusts, heavy physical

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work, heat stress, occupational accidents, industrial chemical and physical hazards, and ergonomic problems make up the list of priorities. Transfer of hazardous technologies and substances from industrialized countries is a problem that developing countries cannot solve by themselves. Effective elimination and control of such severe occupational health and safety hazards is hampered by onesidedly ambitious economic objectives, low coverage of legislation and inspection, non-existent or weak infrastructures for monitoring and services, and a universal shortage of expert manpower and institutions for occupational health. During the process of economic development, growing mechanization and chemicalization of agriculture and industry is expected, calling for preventive occupational health and safety actions.

### **1.1.12.3 Standards of safety vary according to health status vulnerability of the exposed population**

Regulations and standards stipulating the minimum level of safety and health at work are important tools for improving working conditions since they apply to all workplaces and all employed persons. Traditionally all occupational health activities and standards have been designed according to the needs and capacities of an average healthy (male) worker of optimum working age (30-45 years). This group, though important, usually represents only about one-quarter of the total workforce. Other groups include older workers over 55 (about 20%) migrant workers (often a few per cent of the workforce), female workers (30-50% of the workforce) and in some countries child workers who may comprise a few per cent of the workforce. Up to 30% of the working population may have an atopic



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or otherwise vulnerable constitution and about 10-20% of the total workforce and up to 70% of older workers may have one or more chronic diseases that affect their working capacity or make them vulnerable at work. A few per cent of the workforce are permanently handicapped. Thus the majority of the workforce deviate substantially from the 'average' and their number is growing. The special needs of vulnerable groups should always be considered in planning the work environment, working methods, workplace standards and occupational health services. The principle adopted by WHO and ILO is that each individual should be given the opportunity to participate actively in work without risk to his or her health; the principle also applies to vulnerable groups who may risk their health in conditions that may not be hazardous to the 'average' person. Such risk to the vulnerable may occur in conditions that meet the stipulated standards. Continuous vigilance is needed to monitor how conditions of work may affect vulnerable groups. Standards must reflect the need to protect such vulnerable groups and strong measures should be taken by every government to prevent discrimination against vulnerable persons in recruitment. Some governments have successfully provided specific economic incentives for employers who employ handicapped workers. The occupational health research and expert communities together with WHO Workers' Health Programme are expected to give a health-based foundation for appropriate risk assessment and standard-setting in occupational health also in view of protection the health of vulnerable groups. (WHO and ILO, 1994)

**According to the principles of the WHO and ILO, each individual, healthy, handicapped or chronically ill, should be given an opportunity to participate actively in work without risk to get harm to his or her health and working capacity. Such individuals should be effectively**

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**protected against discrimination at work by provision of appropriate legal and other protective measures.**

#### **1.1.12.4 Need for occupational health services for small-scale enterprises self-employed**

It has already been argued that the future growth of employment will primarily be in small enterprises and self-employment. Such small-scale activities often have many advantages for occupational health and safety, but competence and awareness is not always sufficient for prevention and control of hazards in high-risk jobs. The health and economic loss caused by poor occupational health standards and a hazardous work environment may become unreasonably high for the small-scale enterprise, though this is not always clearly recognized. Providing sufficient awareness, knowledge, technology, practices and services for effective occupational health and safety programmes in small-scale enterprises is costly and technically difficult. New activities, new service provision models and new collaboration links need to be developed for this purpose. Collaboration between OHS organizations, industrial and trade associations, chambers of commerce, promotion and extension organizations, training institutions, and various professional bodies are experimented in many countries.

#### **1.1.12.5 Need for specialized skills in occupational health services**

Occupational health needs are becoming more specific and more complex. Such needs should be taken into consideration in designing training programmes for experts. In spite of positive developments in general health services, primary health care and specialized services, a special

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occupational health service with appropriate support systems, including clinical services for the diagnosis and treatment of occupational diseases, is still needed. Surveys of the occurrence of occupational diseases have clearly shown that the country's most advanced in preventive occupational health activity also record the highest numbers of occupational injuries and diseases. This finding may indicate that even higher numbers of cases occur in less developed countries but remain for the most part unrecognized and unregistered and consequently undiagnosed and untreated. Often low rates of diagnoses and reporting speak for inability of the health system to find occupational diseases and injuries. Certain civil and military jobs are carried out in extreme environments, such as offshore oil and gas drillings, projects in remote areas and in unexplored areas or regions (tropics, space, and the ocean floor). Typical of such work is the narrow margin of safety and the high psychological, physical and social demands on workers. Knowledge, both theoretical and practical, should be systematically accumulated and documented on extreme working conditions and on human responses to such conditions. This knowledge should be evaluated and distributed to all who need it, including occupational health experts. A 24-hour occupational health service may be needed for occupations where accommodation is on the worksite, as in offshore activities and seafaring. Availability of effective and competent occupational health services may be vitally important, not only for individual workers but also for the safety of the whole operation. Again, special models for provision of occupational health services for such activities are needed, and relevant special occupational health measures and expertise needs to be guaranteed.

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### **1.1.13 Problem of musculoskeletal and psychological disorders**

Work-related musculoskeletal disorders represent one of the major problems in occupational health for the 1990s and beyond. A similar large scale need is to provide occupational health support in the prevention of psychological and psychosocial problems connected with work. In many countries such new needs call for reorientation of occupational health activities and may affect the structure, composition and training of occupational health service teams.

### **1.1.14 The occupational health approach highly cost-effective**

In most countries occupational health is not a priority and it is not given sufficient resources to carry out the preventive, control or curative activities that are necessary. Thus, many well-known occupational exposures continue to cause a negative effect on workers' health, although prevention would have been both realistic and cost-effective. There is a bulk of convincing evidence that the occupational health approach is highly cost-effective in the prevention and control of occupational and work-related hazards and this approach should be given higher priority in national health and social policy.

**Several new problems in occupational health are related to implementation of new technologies, the use of new chemicals and materials, application of new biotechnology, accidents in new production systems, new infections such as HIV, hepatitis C and other new viral and microbial diseases, the re-emergence of old epidemics such as tuberculosis, growing migration and**

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**mobility of people and workers and new types of organization of work. Numerous ergonomic problems and heavy physical workload are associated with musculoskeletal disorders, causing wide-scale loss of working capacity. The growing performance demands, time pressure and emotional workload in certain occupations (such as health care) are connected with stress symptoms and adverse health consequences.**

The earliest possible prevention and control of preventable hazards would help minimize economic loss at national, company and individual levels and have a positive impact on the further development of work, health, productivity and quality. Occupational health is a positive factor in socioeconomic development and in the development of the general well-being and quality of life of the population. (WHO, 1944)

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## Chapter Two - Health condition of workers in Bangladesh

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## **2. Health Condition of Workers in Bangladesh**

### **2.1 Tannery Worker's**

Tannery industry is an old one in our country that earns a great deal of foreign currency every year. Although this industry is now facing various problems. Tannery industry spreads chemical, bad smell and garbage that pollute air, soil and water. On the other hand the industry makes loud sound that also creates sound pollution. According to Schifferdecker (2010), chemical pollution occurs when chemicals resulting from human activities enter the environment contaminating air, water or soil. Acid rain, greenhouse gases and ozone are all examples of chemical pollution. Pesticides and fertilizers that contain nitrates and phosphates are a source of chemicals that cause water pollution. These chemicals seep into the groundwater and mix with runoff moving to lakes and rivers. Industrial emissions can also cause water pollution. An example is mercury which we find in waste water from paper manufacturers. Instead of remaining inert as expected, the mercury reacts to bacteria in the water and changes to methyl mercury. Now mercury levels in fish such as swordfish can pose dangers to people who eat it. A major source of chemical pollution in the air is fossil fuels burned by utilities, industries and motor vehicles. Sulfur dioxide is produced when coal is burned. It is an ingredient of acid rain and can cause lung damage to people who breathe large amounts of it. Nitrogen oxides are a byproduct of motor vehicles such as cars, trucks and airplanes. These oxides are also an ingredient of acid rain and can cause lung damage to people over time. Other chemicals that cause air pollution include ozone, carbon monoxide and lead. (Schifferdecker , 2010)

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However, many kinds of microbes enter our bodies in different ways that bring various waterborne (diarrhea, dysentery, jaundice, typhoid etc.) and airborne (tuberculosis, scabies, eczema, leprosy etc.) diseases. A group of experts said that emitted wastages from tannery industry make a threat for both environment and human beings. These physical diseases weaken their mental health. Many physicians and psychologists believe that individuals are physical, mental and spiritual beings and that these aspects are interrelated. Consequently, mental health is not possible without both physical and spiritual health. A large number of researchers have found that mental health is related to subjective well-being (Beiser, 1974).

Moriwaki (1974) reported that a nine-item mental health scale was significantly related to negative affect scale (NAS), but not to positive scale (PAS). Bradburn (1977) recommended that positive affect exclusively was related to social interest, sociability, and activity and negative affect only was associated with psychosomatic symptoms, anxiety, poor role adjustment and worries. Veroff et al., (1962) also reported worry, anxiety, and psychosomatic concerns among the correlates of unhappiness. Bradburn and Caplovitz (1965) had also similar findings. Beiser (1974) further found that reports of psychophysiological disorders were associated with a negative affect factor but not with a positive affect factor in his instruments.

### **2.1.1 Health hazards condition**

Tannery workers have been suffering from severe skin diseases, allergy and chest pain. In most of the cases, medicines do not work on them anymore. They process animal hides with toxic chemicals. Before tanning they work with chemical-mixed water, liming and de-liming, scrapping off meat and



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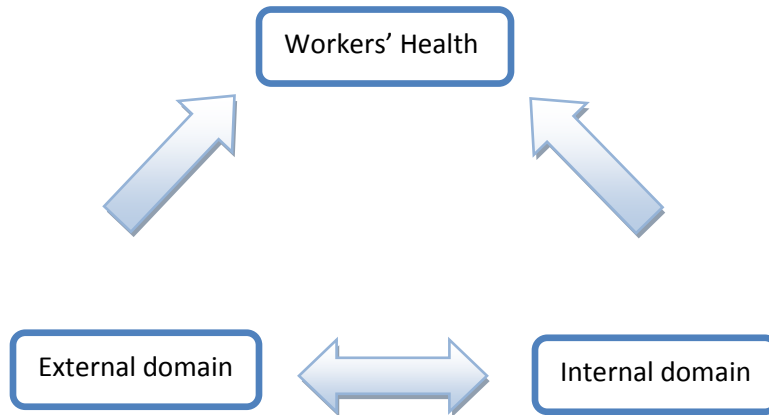
fat. They do it with bare hands chromium, sulfur, manganese, copper compound, lead and others are used to tan which are very toxic for their health. Chemical mixtures, acids and dyes used in the tanneries are very toxic for human health. About half a million residents of the Bangladesh capital, Dhaka, are at a risk of serious illness due to chemical pollution from tanneries near their homes, according to a report released last year by the Bangladesh Society for Environment and Human Development. The report says large numbers of the 8000-12000 workers at the tanneries suffer from gastrointestinal, dermatological and other diseases that could be related to the pollution. The affected area is Hazaribagh, a community in the southeast corner of Dhaka city, where 240 tanneries are located on 25 hectares of land, the report notes. Most of the tanneries are 30-35 years old and use mineral tanning processes that discharge about 6000 cubic meters of liquid effluent and 10 tons of solid waste every day. Coming from different sources about 20,000 tannery workers are forced to work for tanning in this hazardous situation though they are paid a little. About 90 percent tanneries of the country are located at Hazaribagh of the Dhaka city. Covered by high walls which have not proper ventilation system, the air inside the factories is with fumes and heat. Very bad smells are also emitted from nearby Hazaribagh like Rayerbazar, Jhigatola and parts of Dhanmondi. Nobody wants to go to Hazaribagh due to bad effect of tanneries. Even the tanneries' owners don't live in those areas. Reused chemicals from the large factories are being used by the small factories which are more dangerous and vulnerable for the workers as well as for the environment. About 40 heavy metals and acids are used for processing raw hides. (SEHD, 2001)

Scholars, environment specialist, columnist, journalist, and NGO experts are very conscious about the environment of Hazaribagh and Dhaka. They discuss different aspect like water, soil, and air of the

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environment individually. They take “environment” as a watchword, and neglect the workers who live in that environment. They separate environment from the human being and other organisms. Very few scholars talk on laborer who work and live in Hazaribagh; even though almost all workers live in Hazaribagh with or without family. The workers suffer from double-edged problem: as an inhabitant, they face surrounding environment problem directly, and as a worker of tanning industry, they suffer from detrimental chemicals and wastes which are generated in the tannery itself. (IIEDS, 2003)

This article deals with surrounding environments where the workers live, the kind of work they engage in, and the ways in which that work affects their health. Occupational health issues is divided into two arenas—“an internal domain, which focuses on the workplace (micro-environment), and an external-contextual domain, which examines the wider social and global issues”. We are in debt to Nuwayhid for using this terminology. As this article is about a certain area and industry, we use internal domain to mean the internal set up of the industry, and external domain to denote surrounding areas. However, if we take into consider our field work, and if we want to draw a clear sketch of workers’ health of Moti-tannery, we need to discuss the two domains, because two domains work individually or together to determine workers’ health of Hazaribagh. (**Figure 1**).Internal domain deals with workplace where workers spend most of time of a day, and external domain covers the surrounding areas where they spend rest of time outside of working hours. Hazaribagh tannery workers’ health problem is not only limited in either internal or external domain separately but it can be affected by the both domains together. (Nuwayhid, 2004)

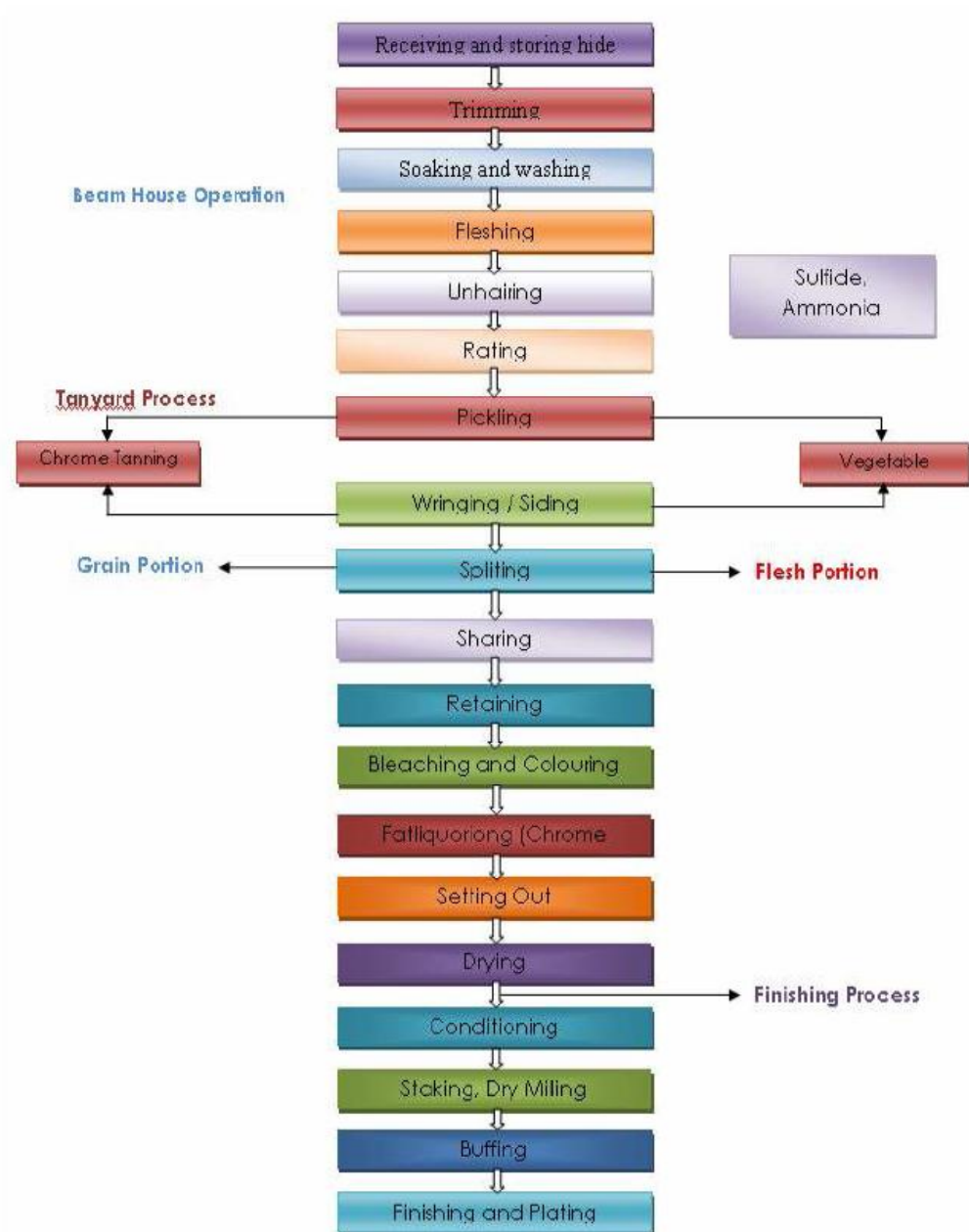


#### How the two domains affect the health

Leather tanning is the process of converting raw hides or skins into leather. Hides and skins have the ability to absorb tannic acid and other chemical substances that prevent decaying, make them resistant to wetting. Tanning is essentially the reaction of collagen fibers on the hide with tannins, chromium, alum or other chemical agents. The most common tanning agents are chromium and vegetable tannins extracted from specific tree barks. (Verma et al., 2008)

Figure:- 1 represents the general flow diagram for leather tanning and finishing process (De Nicola et al., 2007).

**FIGURE 1**  
**GENERAL FLOW DIAGRAM FOR LEATHER TANNING AND FINISHING PROCESS**



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### **2.1.2 Socio-economic condition of Tannery Worker's**

Mofazzel Hossain is slight of build and speaks in a soft, halting voice.

Now 45, he has worked in leather tanneries since he was 10 years old. He's also suffered from gastric problems and headaches for the last nine years.

"Every month I am ill," he said. "Any time I can get sick because this environment is so bad, but I don't have any other employment options."

Mofazzel's job is to soak and treat animal hides with over 100 chemicals. His basic pay is about US\$103 per month and he can earn an additional \$26 per month with overtime – but he spends as much as a quarter of his salary on medicine and healthcare.

### **2.1.3 External Domain**

Little argues that in general, environment as a term is frequently used "as a synonym for nature (i.e. the biophysical or nonhuman environment)", but this kind of practice formulates a "conceptual confusion because the environment of a particular human group includes both cultural and biophysical elements. By extension, the organism/environment dynamic, which is relational and perspectives, is often erroneously fused with the nature/culture dualism, which is essentialist and substantive." The environment includes all surroundings of any given person or object. According to the eco- logical point of view, the environment is all factors which have influence on the existing and reproduction of living organisms. The environment consists of "material factors whose presence is decisive for survival and development of living organism (oxygen, carbon, hydrogen), and factors regulating the living process". In Hazaribagh, tanning industry and nature are existing together side

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by side, and both are part of same environment. Tanning industry, as a part same environment, how affects the other parts (natural and non-natural) of same environment will take into consider in this article. The sun is not in the mid-sky; however, it is too hot. There is no escapable way from the wind which carries a terrible odor. There are many narrow roads where not more than one man and one rickshaw can go side by side. Some roads are damaged, some are under construction, and some are only gravel, which creates dust everywhere. Furthermore, there are many turns within short distance, and many manholes without covers. Two narrow drains run along the two sides of the roads. Plastic bags, bottles and packets float in the drain. Black colored dregs from the drain pile up on the road. Open drains are used as a toilet. Different colored water flows in the drain for going somewhere. Dogs made of skin and bones roam here and there. Wastes- wastes not only from tanneries, but also from the houses where the workers are living, are kept on the road. The city corporation has set out certain bins for throwing garbage in on the road, but they are all full. Huge amounts of garbage surround the bins, where reeking water and malodor stream from. Mosquitoes and insects fly randomly. *Tokai* (street boys) search for things in the garbage. According to one worker, “*This is a hell*”. One informant says that crows like “*wastes, rotten things*”, and, for this reason, a lot of crows live here. Besides crows there are no birds; besides dogs and cats, there are no animals. Therefore, in a environmental setting, in Hazaribagh, two or more creatures like workers, dogs, cats, crows, poor people make a “mutual ecology”. Ecological anthropologists are mainly concentrated on the equilibrium between human being and environment. It means that creatures make an ecological *niche* in a certain environment, which is influenced by social networks making agents. In Hazaribagh area, unavailability of needs forces dogs, cats, crows to eat wastes, and compels the workers to live with wastes. Unavailability of human basic needs—food, cloth, shelter, education and

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treatment—creates such an environment which brings the workers, poor, vulnerable, marginal and so on under an umbrella. (USAID, 2009)

Everyday up to 40,000 tones of tannery waste, including toxic water and untanned solid wastes like raw trimmings, fleshings, pelt-trimmings follows into the Buriganga River, the main water bodies for trading and ferry journey. Toxic water has harmful effects on the broad spectrum of organisms in the ecosystem. The wastewater falls into ponds or lagoons, and this water contaminates underground water, which has dangerous effects on the human body and environment. People collect drinking water either from a tube well or from a pipe to drink. But most of the basti people use water from ponds, doba, or Jhil (all are sources of water) for their daily use. Due to water pollution, life of water species is negatively affected. Hossain et al. (2007: pp. 397-416) shows that how the waste (if it is reused) is harmful not only for Hazaribagh, but also for uncountable numbers of people. It can be the cause of large number of illness such as allergy, eczema and dermatitis (ibid). Tannery creates dusts, fumes and malodors which can affect different part of the lungs. (Salam & Gain, 2009)

Solid wastes and toxic water are mainly generated in the tanneries, and the main sufferers are those people, the workers, who live in the centre and surrounding areas of Hazaribagh. Bangladesh has to pay a high cost for environmental pollution because of leather industry. Islam - identify mismanagement, inferior technologies, and lack of facilities for treating industrial wastes, wrong approach towards industrialization as causes of environmental pollution. (Islam et al. 2011)

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On the other hand, Liver man - identify many ingredients of chemicals remain in environment for a long time for the sufferings “vulnerable populations such as children, the elderly, the chronically ill, minorities, and the poor may be at increased risk of harm related to environmental contamination because of biological and demographic factors, including where they live”. (Liver man et al. 1997)

#### **2.1.4 Internal Domain**

##### **Scattered Floor**

Wet floor and unplanned setup of the machines can be a great risk for the workers’ health. In workplace of Moti tannery, unplanned setup of the machines creates a considerable obstacle for the movement of workers on the floor. The workplace—in the sense of arrangement of the machines on the floor, paths of walking, electric circulation, tools, water supply, lighting, ventilation, washroom, safety dress, place of rest, etc., create a in- door environment in the workplace which has direct influence like injuries on workers’ health. The narrow walking paths inside the Moti-tannery cause many injuries of the workers. Basically, there are no specific paths on the floor. On the ground floor the paths are made between the machines, and between the manual workplaces and machines. Many machines such as drying, shaving, splitting, and coloring are set up on the ground floor. The first floor is decorated with five machines—a plate (to dry and iron), a be gum (to iron and soft), a buffer (to make thin), a toggle (to dry), and fine skin measurement machine (to measure). The rest of the place is used as a drying and packing section. The second floor is almost empty; only three outworn machines are kept there. Like the ground floor, on the first and second floor there are no fixed paths to walk. The southern sides of first and second floors are open, while the ground floor is surrounded



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by other tanneries. From the beginning of field work till the end many things are coped except the lighting system on the floor. The workers are used to working in this dim light. On the ground floor, when the blue materials (after chroming skin is called blue material), finished or non-finished materials are selected and scrutinized, they use an extra lighting system. Three or four tube lights are tied together with a plate that generates powerful lighting. Rafique<sup>5</sup> informs that he lost the power of his eyes because of low power of the lights. A lot of dusts and fumes make the lights dim. Furthermore, there is no chance of sun light on the ground floor to enter. The ground floor of the tannery is always wet due to lack of sunlight. In the winter season, sufferings of the workers become twice on the wet floor. As there are no heating system and arrangement of hot water, the workers toil in cold environment with cold water. (WHO, 2006)

On the ground floor there are no windows or extra doors apart from the main gate. There are only two ventilators with adjuster fans; however, the adjuster fans do not work. Except for a couple of stand fans, there are no ceiling fans. Kalam acknowledged that during the summer season, over-sweating makes them tired, and creates breathing problems because of the scarcity of fresh air. In Moti tannery the owners arrange water from the underground that is used for both drinking and production. Two pipes, one for coming water from underground and another for circulating water, are inside the tannery. The pipes are fixed with a pillar, and the water is reserved in an underground reservoir which is called tanky. However, the water tank has no cover. The mouth of the tank is equal level to the floor. RC-Cola bottle floats over the tank water. The workers put their dirty clothes on the pipes when they take rest, and water and fluids from the clothes drop in the tank water. Moreover, blue materials are piled beside the tank. Chrome water from blue materials crawls and drips into the tank slowly.

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When water comes from the underground, it is preserved in a pot for whole day. But some workers drink the tank water directly. They think that tank water is good; it comes from the deep underground.

About the toilet, Pinto says, “*If you enter in the toilet, you will die.*” There is no hygienic toilet culture in Moti tannery whatsoever. There is one toilet for all workers, men and women. The toilet is at the corner of the tannery-beside the drum of sulfuric acid. There is no cover of the door. One drum is in front of the workers’ toilet, which is used as a cover of the door. There is no water supply in the toilet-the workers bring water from the pipe outside. It is completely unclean and full of malodor, adds Pinto.

Das and Grady say “small changes in work- place dimensions can have considerable impact on worker productivity and occupational safety and health”. In this statement the author says “small changes”. It means that there is a standard scientific set up of instruments in workplace and the workers do one particular work. If one position of the floor, workplace or instrument is changed, occupational safety can be hampered. Therefore, the Moti tannery is an example of a non- standard scientific set up—unplanned floor, old model equipments, unhygienic toilets and scattered drain on the work floor which make workers’ health more extremely vulnerable. Work and health are integrated issues. Therefore, health problems of workers in the tanning industry include the kinds of work they engage in, the manner in which they work, and conditions of the work place. Firstly, the external domain where they live will be described. Secondly the interior setup that is called internal domain will be talked about. Internal domain includes floor organization, equipments, chemicals, workers’ perceptions and attitude to the equipments and chemicals etc. (Das and Grady, 1983)

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## **2.2 Fish seller's**

Fish sellers have been suffering from skin diseases, back pain, cough, chest pain and cold. The primary and main occupation of the community people is fishing. 74% households are engaged in fishing. 13% of the population is in some sort of services, 6% works as day labor and 7% of the populations is involved in other activities like fish selling, rickshaw-van driving and net mending. It was learnt that the catch per unit effort is declining.

### **2.2.1 Socio-economic condition of Fish seller's**

Md. Dulal Hossain is slight of build and speaks in a soft, halting voice.

Now 46, he has worked in selling fish since he was 18 years old. He's also suffered from gastric problems and headaches for the last 3 years.

"Every month I am ill," he said. "Any time I can get sick because this environment is so bad, but I don't have any other employment options."

His basic pay is about US\$45 per day, but he spends as much as a quarter of his salary on medicine and healthcare.

## **2.3 Cleaner's**

Cleaners have been suffering from severe skin diseases, back pain, respiratory problem and chest pain. They work in the dust environment most of the time as a result they suffer very much from respiratory problem. There is no well primary protection against dust and chemicals.

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## 2.4 Mechanic Worker's

Micro and small enterprise comprises over 98 percent of all industrial units in Bangladesh. They are responsible for the creation of four out of five industrial employment and account for over 46 percent of the industrial contribution to gross domestic product of the country. Small metal workshops in Dhaka areas create employment for thousands of poor and marginalized low skilled people. Mechanic workers have been suffering from severe Hearing problem, Blurred vision, back pain and chest pain. Infrastructure of the workshops is non-engineered. The shops are basically brickwork and do not possess any lateral load resistance mechanism. **Artificial Hazards:** Fire, Electrical, Mechanical. Negligence during welding operation, electricity short circuit can cause fire hazard since most of the workshops have no fire extinguishing arrangement. Moreover the workshops are located in highly dense area which increases the possibility of serious accidents. Health and safety issues mainly arise from the use of machines, washing by lubricant oils as well as due to constant exposure to hazardous waste from several machines and processes involved in various activities. The health and safety issues are as important as the environmental issues in the workshops. Major health hazards arise from the following operations: 1) Welding without adequate protective measures can cause serious eye problems due to exposure to glare of welding arc and burns etc. 2) There are several health hazards in drill operation. Excessive exposure to ambient heavy metal dusts can cause serious respiratory diseases, eye problems and accidents. 3) Lathe machines can cause similar health problems like drilling does. 4) Blacksmiths are exposed to excessive heat and dust and as a result most of them are likely to have respiratory diseases at an advanced age. 5) Paint aerosols produced during spray painting can cause eye and respiratory problems. 6) Long exposure to lubricant oils during washing of engines, tools, equipment etc. can cause skin diseases as they contain toxic chemical additives. 7)

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Power disruption with voltage fluctuation is a common occurrence in the workshops. The workers have to work in insufficient light, which can cause eye problem. 8) Most of the workshops are packed with different instruments/machines, leaving very little working space for the worker which can cause accidents. (Ahsan, M. R. et al., 1999)

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## Chapter Three – Literature Review

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### 3. Literature Review

Many researchers have investigated the working conditions in the Bangladesh tannery industry, Mechanic workers, Cleaners and Fish workers. In fact, working conditions in those sector are below standard and do not meet the **ILO** standards. Labor standards and rights are commonly ignored in those sectors in Bangladesh.

The whole tannery industrial activity entails a series of tasks which pose threats to the ambient environment and health of working people. The tanning industry causes horrendous environmental pollution and high environmental impact of tannery effluents makes its treatment an essential fact, mainly due to its volume, nature and concentration of pollutants such as tanning agents (chromium and tannin), color, organic matter and others. Many authors have worked regarding tanneries of Hazaribag before showing the impact of various pollutants on water, water test results, health hazards and some measures but no prior work was found conducting EIA during literature review. However, the adverse effects of tannery pollutants on environment and health are discussed here.

It's no secret that Bangladesh is one of the world's poorest countries and that its laborers earn some of the lowest wages. Its garment factories' dangerous working conditions have been well-documented. But there's another industry in the country that is even more threatening to workers' health and the environment: tanneries that produce leather for clothes, shoes, handbags, jackets, belts and luggage sold around the world.

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Tanneries are an important industry for the destitute country, accounting for more than an estimated \$600 million in exports each year. About 90 percent of it is produced in Hazaribagh, an area in the capital of Dhaka that just last month was rated among the five worst toxic threats in the world by the Blacksmith Institute.

The chemicals used in the tanning process can cause cancers of the lungs, nose and bladder, according Dr. Khalilur Rahman, a radiologist at Dhaka University.

And while the cheap Bangladeshi labor lowers the cost of leather goods sold in wealthy countries like the U.S., Japan, Spain, China, South Korea, Italy and Germany, there is a price paid in the human misery of Hazaribagh.

"This is a product that is used worldwide for luxury goods, but for these workers who are making them, neither the owners nor the government are looking after our health and safety," Abdul Malek, head of the Tannery Workers Union, said through a translator.

A Human Rights Watch investigation last year found no attempt by authorities to crack down on polluting tanneries, calling Hazaribagh "an enforcement-free zone."

"This is because the government wants only to buy the argument of earning foreign export," said Syeda Rizwana Hasan of the Bangladesh Environmental Lawyers Association. "So I would say this is a case of total absence of governance."



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According to Imamul Huq (1998), various chemicals are used during the soaking, tanning and post tanning processing of hides and skins. The main chemicals used include sodium sulphite and basic chromium sulphate including non-ionic wetting agents, bactericides, soda ash, CaO, ammonium sulphide, ammonium chloride and enzymes. Others are sodium bisulphate, sodium chlorite, NaCl, H<sub>2</sub>SO<sub>4</sub>, formic acid, sodium formate, sodium bicarbonate, vegetable tannins, syntans, resins, polyurethane, dyes, fat emulsions, pigments, binders, waxes, lacquers and formaldehyde. Various types of processes and finishing solvents and auxiliaries are used, as well. It has been reported that only about 20% of the large number of chemicals used in the tanning process is absorbed by leather, the rest is released as waste. Hazaribag which is the largest tannery region in Bangladesh consists of more than 200 tanneries generate 7.7 million liters of liquid waste and 88 million tons of solid waste every day. The direct discharge of these wastes has contaminated the ground and surface water with dangerously high concentrations of chromium, as well as cadmium, arsenic, and lead. The contamination of rivers also allows these pollutants to accumulate in common fish and shellfish species, which are used as local food sources. The dumping of untreated liquid tannery wastes from tannery industries at Hazaribag, Dhaka is the major source of pollution of Buriganga. The chromium released from the Hazaribag tannery industries has been contaminating the water of the river Buriganga for the last 45 years. A statistics available from the Department of Environment reveal that 95 per cent of the tannery industries have been built in unplanned way at the congested places of Hazaribag during the last fifty years. According to a recent estimate, about 60,000 tons of raw hides and skins are processed in these tanneries every year, which release nearly 95,000 liters of untreated effluents into the open environment daily, resulting into the dead river Buriganga. Chromium is a naturally occurring heavy metal that can exist in air, water, soil, and food, and common exposure pathways include ingestion, inhalation, and dermal contact. The primary health impacts from

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chromium are damage to the gastrointestinal, respiratory, and immunological systems, as well as reproductive and developmental problems. Chromium is a known human carcinogen. In addition, the chromium-laced solid wastes from tanneries are often converted into poultry feed as is the case in areas of Bangladesh—and can thus impact livestock and humans. According to the WHO, over 8,000 workers in the tanneries of Hazaribag suffer from gastrointestinal, dermatological, and other diseases, and 90% of this population die before the age of 50. (Imamul Huq, 1998)

Work areas are often over crowded with limited workspaces, causing occupational hazards such as musculoskeletal disorders and contagious diseases. Injuries, fatalities and disablement are frequent in those sectors. The absence of labor standards monitoring system and ineffective building codes, poor enforcement and outdated labor laws, and a lack of awareness of labor rights among workers are the major problems in this sector.

In 2008, the **United Nations Industrial Development Organization** recommended that tannery industrial pollution is a serious threat for the environment. Shikder (2009) conducted a study regarding the effect of tannery pollution on workers and dwellers' physical health. The findings indicate that Hazaribagh tanneries have a negative impact on workers and the dwellers' physical health. He explained that the factories are exposing huge amount of toxic substances and heavy metals that lead to many health problems including cancer, allergy, asthmas etc. (UNIDO, 2008)

The **SEHD (Society for Environment and Human Development)** report indicates that 58% of the tannery workers suffer from gastrointestinal disease (vs 24% for the country as a whole), 31% from dermatological diseases (vs9%),12% from hypertension (vs 0.9%) and 19% from jaundice (vs0.07%).

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A recent article in a Bangladeshi newspaper, The Independent, says that “residents in the Hazaribagh area have been complaining for a long time that the tanneries emit bad odor and pollute the air beyond tolerable limits”. Chromium, the **SEHD** report says, is one of the most harmful chemicals found in the tannery waste because of its carcinogenic potential. Acidic effluents, it adds, can cause severe respiratory problems. Gaseous emissions from the tanneries contain sulfur dioxide that is converted into sulfuric acid on contact with moisture and can damage lungs. The SEHD report indicates that 58% of the tannery workers suffer from gastrointestinal disease (vs. 24% for the country as a whole), 31% from dermatological diseases (vs. 9%), 12% from hypertension (vs. 0.9%) and 19% from jaundice (vs. 0.07%). A recent article in a Bangladeshi newspaper, The Independent, says that “residents in the Hazaribagh area have been complaining for a long time that the tanneries emit bad odor and pollute the air beyond tolerable limits”. (SEHD, 2001 )

Kanpur is a major leather processing center in India, where a large number of tanneries are situated. During tanning process, workers are constantly exposed to heat, leather dust produced in buffering operations and a wide range of chemicals. All these factors are known to cause dry eye. Being ophthalmologists of a tertiary health care center in Kanpur, we used to notice over a period of time that a considerable number of patients with dry eye symptoms, attending our out-patient department, were related to leather tanning industries. But, no published data is available on the prevalence of and risk factors for dry eye disorders among tannery workers. To estimate the prevalence of dry eye problem and its severity among the workers of leather tanneries in the industrial belt of Kanpur and to evaluate various risk factors related to it.

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In this cross-sectional case-control study, Ocular Surface Disease Index (OSDI) Questionnaire was presented to randomly selected tannery workers and control group. OSDI score was calculated based on subjects' response, and was evaluated with OSDI chart to assess the magnitude of dry eye symptoms and to grade its severity. RESULTS were analyzed statistically to evaluate the significance level. A total of 800 workers were selected by simple random sampling, out of which 72 workers were excluded from the study. Thus the questionnaire was presented to a total of 728 workers, while control group included 260 individuals. All the workers as well as controls were male with age ranging from 20 to 59 years. The mean age for tannery workers was  $34.05 \pm 8.96$  years and that for control group was  $32.97 \pm 10.59$  years ( $p = 0.14$ ). The tannery workers had mean duration of work at tanneries for  $6.99 \pm 4.86$  years. The prevalence of dry eye symptoms among tannery workers was 33.79% (95% CI: 30.35-37.24), while that in control group was 15.77% (95% CI: 11.31-20.23) ( $p < 0.0001$ ). Among symptomatic workers, 47.96% (95% CI: 41.68-54.26) workers had mild, 36.99% (95% CI: 30.91-43.07) workers had moderate and 15.04% (95% CI: 10.54-19.54) workers had severe dry eye symptoms. Severe symptoms were more prevalent among symptomatic workers of age  $\geq 40$  years in comparison to those  $<40$  years (34.72% versus 6.90%,  $p < 0.0001$ ). With increase in duration of work (1-5, 6-15 and 16-25 years), both prevalence and severity of dry eye symptoms increased significantly ( $p = 0.036$  and  $<0.0001$ , respectively). Dry eye is a significantly prevalent occupational hazard among tannery workers, severity of which increases with the age and the duration of work in tannery. Chemical exposure in hot and dusty working environment of a tannery may have a causative role. Tannery workers should be motivated to use various preventive measures to reduce chemical and dust exposure such as wearing protective glasses, and their ocular health should be monitored periodically for adequate and timely treatment, if required. "Indiscriminate use of chemicals at almost every workplace is a common phenomenon in our country. Hundreds of people die annually thanks to

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their hazardous work, particularly in ship breaking, tannery and chemical industries as well as farming, which are in the top death ranks," said National Expert on Chemical Safety Dr Shahriar Hossain.

According to a survey conducted recently by Bangladesh Occupational Safety, Health and Environment Foundation (OSHE), at least 21 people die in Bangladesh due to toxic chemicals each month. As per an International Labour Organisation (ILO) report, about two million people die annually across the world due to chemical related diseases while about 160 million people are affected by such diseases. In one third of these cases, the report said, illness causes loss of working days and increases number of accidents at work places. Citing different studies in Bangladesh, Dr Shahriar said, "Around 85 per cent farmers exposed to toxic and hazardous pesticides and other chemicals during their work while more than 30 per cent of them become seriously ill." In the ship-breaking industries, he said, more than 1000 workers have been killed due to chemical poisoning since 1996 in the country, while around 20,000 tannery workers are at high health risk. Almost all workers are exposed to toxic chemicals at their work stations while three hundred to five hundred workers lose their jobs due to serious illness every year, said the ILO report. According to a study jointly conducted by ILO, Asian Development Bank (ADB) and signed by Regional Technical Assistance Agreement (RETA) in November 2000, the occupational health and safety service in Bangladesh is still at the developmental stage. Like other developing countries, pre-existing malnutrition and a high prevalence of infectious disease, however, frequently compound the problems of exposure to occupational hazard. A World Health Organization report said, long-term exposure to pesticides can increase the risk of developmental and reproductive disorders, immune-system disruption, endocrine disruption, impaired nervous-system function, and development of certain

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cancers and children are at higher risk from exposure than are adults. Expressing concern over uncontrolled use of chemicals at workplaces, Labour Advisor of Bangladesh Employers' Federation (BFF) Kazi Saifuddin Ahmed said, "Lack of knowledge and awareness of owners and labourers are also responsible for the hazard both the owners and workers will have to be conscious to minimize the health risk." Dermatologist of Bangabandhu Sheikh Mujib Medical University Dr Dipak Kumer Das said, the chemicals can enter human body in three ways--inhalation (when chemical is in gas, vapor or fume form and enter by breathe,) absorption (when it passes through the skin, eyes) and ingestion (when chemicals goes in to mouth). The toxicity of chemicals, said the expert, affects respiratory, renal, cardiovascular, reproductive, nervous, immune systems of human body and also creates different skin problems.

One in three (33 per cent of) Canadian employees are now suffering or have suffered from a mental health condition such as depression or an anxiety disorder, according to a survey by Morneau Shepell. Another 27 per cent said they are experiencing significant symptoms of stress, found the poll of employees, employers and physicians.

Cleaners and Mechanic workers have been suffering from severe skin diseases, back pain, respiratory problem and chest pain. They work in the dust environment most of the time as a result they suffer very much from respiratory problem. There is no well primary protection against dust and chemicals.

Fish sellers have been suffering from severe skin diseases, cough and cold. The primary and main occupation of the community people is fishing. 74% households are engaged in fishing. 13% of the population is in some sort of services, 6% works as day labor and 7% of the populations is involved

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in other activities like fish selling, rickshaw-van driving and net mending. It was learnt that the catch per unit effort is declining. This statement of the fishermen is similar to the article of Mr. Ali Haider (who wrote in the Daily Suprobhat Bangladesh dated on 7 March 2010). (Mr. Ali Haider, 2010)

Mechanic workers have been suffering from severe Hearing problem, Blurred vision, back pain and chest pain. Infrastructure of the workshops is non-engineered. The shops are basically brickwork and do not possess any lateral load resistance mechanism. Artificial Hazards: Fire, Electrical, Mechanical. Negligence during welding operation, electricity short circuit can cause fire hazard since most of the workshops have no fire extinguishing arrangement. Moreover the workshops are located in highly dense area which increases the possibility of serious accidents. Major health hazards arise from the following operations: 1) Welding without adequate protective measures can cause serious eye problems due to exposure to glare of welding arc and burns etc. 2) There are several health hazards in drill operation. Excessive exposure to ambient heavy metal dusts can cause serious respiratory diseases, eye problems and accidents. 3) Lathe machines can cause similar health problems like drilling does. 4) Blacksmiths are exposed to excessive heat and dust and as a result most of them are likely to have respiratory diseases at an advanced age. 5) Paint aerosols produced during spray painting can cause eye and respiratory problems. 6) Long exposure to lubricant oils during washing of engines, tools, equipment etc. can cause skin diseases as they contain toxic chemical additives. 7) Power disruption with voltage fluctuation is a common occurrence in the workshops. The workers have to work in insufficient light, which can cause eye problem. 8) Most of the workshops are packed with different instruments/machines, leaving very little working space for the worker which can cause accidents.

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In Kenya, Tannery workers in various production lines had significantly ( $P < 0.05$ ) higher mean airborne Cr levels ( $\pm$  standard deviation [SD] of  $63.0 \pm 11.6 \mu\text{g}/\text{m}^3$ ) compared to those in the control group ( $1.39 \pm 0.64 \mu\text{g}/\text{m}^3$ ), and general workers had significantly ( $P < 0.05$ ) higher mean concentrations of Cr ( $66.8 \pm 13.1 \mu\text{g}/\text{m}^3$ ) than those in other lines of production. A significant positive association ( $R^2 = 0.76$ ,  $P < 0.001$ ) was also observed between urinary and breathing zone air Cr levels. Mean urinary Cr level exceeded the American Conference of Governmental Industrial Hygienists biological exposure index for Cr of  $30 \mu\text{g}/\text{g}$  creatinine, and 78% of Cr levels of the general workers exceeded this limit. Tannery workers showed a significantly ( $P < 0.05$ ) higher prevalence of respiratory and dermatological symptoms (30% and 20%, respectively) compared to the control group (10% and 7.5%, respectively). It was further established that production workers had significantly reduced ventilator function, with 17% experiencing pulmonary obstruction, 13% pulmonary restriction, and 7.5% both manifestations compared to 5% for each of the listed corresponding manifestations in the control group. (Kenya Gazette, 1966)



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## Chapter Four – Aim and Objectives

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#### **4. Aim and Objectives**

The main objective of the present study was to investigate the effect of work environment on the physical health of workers. The specific objectives were:

- i. To investigate overall physical health of the tannery workers, Fish sellers, Mechanic workers and Cleaners.
- ii. To investigate which disease and symptom is most prominent among them.

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## Chapter Five – Materials and Methods

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### **5.1 Type of study**

The study was a survey based study.

### **5.2 Study area**

We conducted our study in the areas of Hazaribagh, Abdullahpur (uttara), Azopmpur(Uttara), Azimpur and Old Dhaka City. All the areas are from Dhaka District.

### **5.3 Sample**

A total of 351 (100 tannery workers, 51 cleaners, 100 fish sellers and 100 mechanic worker) respondents was selected by purposive sampling method as subject for the present study. Some of respondents were unmarried and their educational background was class V- HSC. All participants came from middle class family and monthly income was TK.6000- TK. 20000. Their age range was 12 to 70 years.

### **5.4 Measuring Instruments:**

- i) Overall Health Questionnaire Part 1.
- ii) Overall Health Questionnaire Part 2.
- iii) Physical Health Questionnaire.

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## **5.5 Procedure**

For collecting data, the second author went to the tannery industry and before applying the questionnaire he introduced the authority and took formal permission. Then he gave them the questionnaire and the workers were asked to read the instruction printed in the first page of the questionnaire. They were instructed to complete it without wasting time. After completing their task, according to the instruction, the booklet and answer sheets were collected from them. In this way data were collected from other workers.

## **5.6 Statistical analysis**

Data were organized, tabulated and aggregated using SPSS (Statistical Package for the Social Sciences). Distributive analysis of the health parameters was compared amongst the study population.

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## Chapter Six - Result

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## 6.1 Demographic profile of participants:

**Table: 6.1.1 – Number of participants**

Sex	Number of Participants 351	
	Frequency	Percentage (%)
Male	340	96.9
Female	11	3.1

Number of Male participants is 340 and Female participants is 11.

**Table: 6.1.2 - Age**

Age	
Highest	70
Lowest	12
Age mean	29.47
Standard deviation	10.334

Highest age value is 70 and lowest age value is 12. Age mean is 29.47 and standard deviation is 10.334.

**Table: 6.1.3 – Number of participant's occupation**

Group of Worker	Occupation (overall)	
	Frequency	Percentage (%)
Tannery worker	100	28.5
Fish seller	100	28.5
Cleaner	51	14.5
Mechanic worker	100	28.5

A total of 351 (100 tannery workers, 51 cleaners, 100 fish sellers and 100 mechanic worker) participants was selected by purposive sampling method as subject for the present study.

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**Table: 6.1.4 – Number of participant’s marital status**

<b>Marital Status</b>	<b>Marital Status</b>	
	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Unmarried</b>	<b>158</b>	<b>45.01</b>
<b>Married</b>	<b>191</b>	<b>54.42</b>
<b>Widowed</b>	<b>2</b>	<b>0.570</b>

Some of participants were unmarried, married, widowed and their educational background was class V- HSC. All participants came from middle class family and monthly income was TK.6000- TK. 12000. Their age range was 12 to 70 years. We found in our study “Male” 340 participants and “Female” 11 participants. Some of participants were unmarried 45.01 %, married 54.42 %, widow 0.570 %.

## **6.2 Occupation (by sex) :**

**Table: 6.2.1 - Number of participant’s occupation by sex**

<b>Group of worker</b>	<b>Occupation (by sex)</b>	
	<b>Male</b>	<b>Female</b>
<b>Tannery Worker</b>	100	
<b>Fish seller</b>	100	
<b>Cleaner</b>	40	11
<b>Mechanic Worker</b>	100	

In our survey study, we select four categories of worker such as- Tannery worker, Fish seller, Cleaner and Mechanic worker. Three hundred and fifty one (100 tannery workers, 100 fish sellers, 51 cleaners and 100 mechanic workers) respondents were selected by purposive sampling method as samples for the present study.



### 6.3 Tendency of addiction for occupational participants:

**Table: 6.3.1 - Number of participant's tendency of addiction (Overall)**

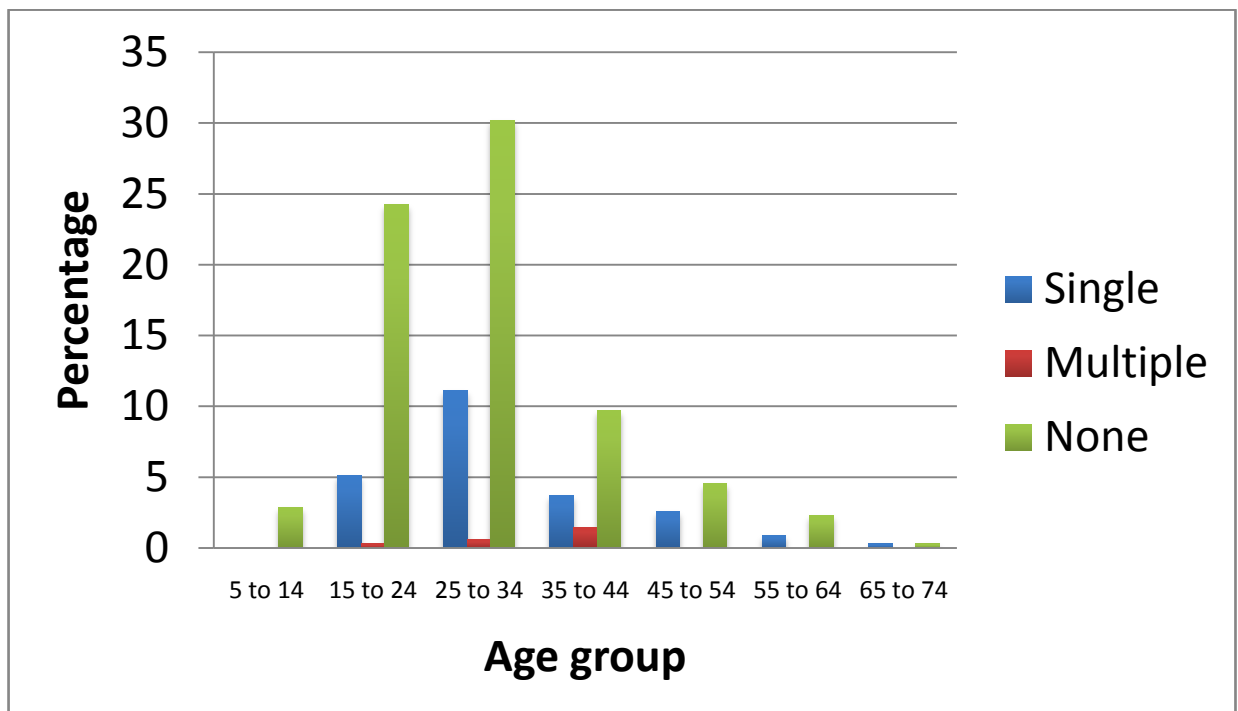
Addiction (Overall)	
<b>Addicted</b>	<b>None</b>
25.7 %	73.2 %
<b>Single addicted</b>	<b>Multiple addicted</b>
23.4%	2.3 %

We found that most of the respondents are addicted (25.7 %) and most of the respondents are Non-addicted (73.2 %).

**Table: 6.3.2 - Number of participant's age group**

Age Group	Addiction (Age group)			Total
	Single	Multiple	None	
5 to 14	0/0%	0/0%	10/2.84%	<b>10</b>
15 to 24	18/5.12 %	1/0.284 %	85/24.22%	<b>104</b>
25 to 34	39/11.11 %	2/0.569 %	106/30.199%	<b>147</b>
35 to 44	13/3.70 %	5/1.424 %	34/9.687%	<b>52</b>
45 to 54	9/2.56%	0/0 %	16/4.56%	<b>25</b>
55 to 64	3/0.854 %	0/0 %	8/2.28%	<b>11</b>
65 to 74	1/0.284 %	0/0 %	1/0.284%	<b>2</b>
<b>Total</b>	<b>83/23.63 %</b>	<b>8/2.28%</b>	<b>260/74.09%</b>	<b>351</b>

15 to 24 of age respondents are addicted on Single drug (5.12 %) and Multiple drugs (0.284 %), 25 to 34 of age respondents are addicted on Single drug (11.11 %) and Multiple drugs (1.36 %), 35 to 44 of age respondents are addicted on Single drug (3.70 %) and Multiple drugs (1.424 %), 45 to 54 of age respondents are addicted on Single drug (2.56%), 55 to 64 of age respondents are addicted on Single drug (0.854 %) and 65 to 74 of age respondents are addicted on Single drug (0.284 %).



**Figure:-2** Age group of addicted participants.

**Table: 6.3.3 - Frequency and Percentage of Addiction**

Addiction ( Frequency and Percentage )		
	Frequency	Percentage (%)
<b>Marijuana</b>	15	<b>4.2 %</b>
<b>Alcohol</b>	84	<b>23.7 %</b>

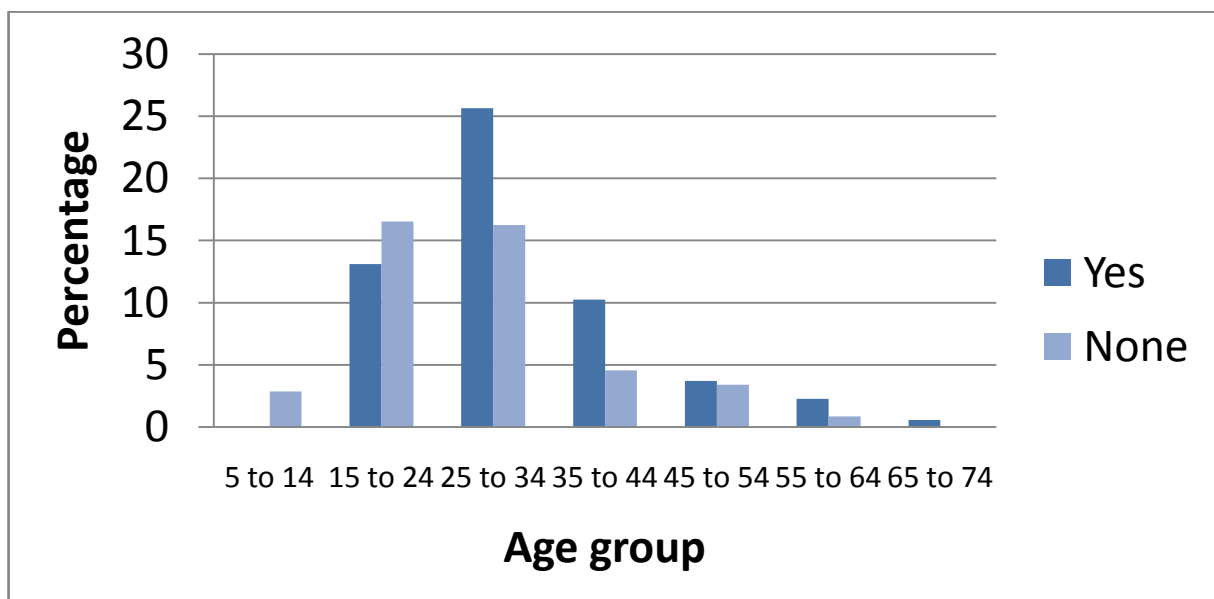
Within this result some of respondents are addicted to Alcohol (23.7 %) and some of respondents are addicted to Marijuana (4.2 %).

## 6.4 Smoking

**Table: 6.4.1 - Number of participant's age group**

Age group	Smoking (Age group)		Total
	Yes/Percentage	None	
5 to 14	0/0%	10/2.85%	10
15 to 24	46/13.11%	58/16.52%	104
25 to 34	90/25.64%	57/16.24%	147
35 to 44	36/10.26%	16/4.56%	52
45 to 54	13/3.70%	12/3.41%	25
55 to 64	8/2.27%	3/0.855%	11
65 to 74	2/0.569%	0/0%	2
<b>Total</b>	<b>195/55.55%</b>	<b>156/44.45%</b>	<b>351</b>

15 to 24 of age respondents are addicted on smoking (13.10%) , 25 to 34 of age respondents are addicted on smoking (25.64%), 35 to 44 of age respondents are addicted on smoking (10.26%) , 45 to 54 of age respondents are addicted on smoking (3.70%), 55 to 64 of age respondents are addicted on smoking (2.27%) and 65 to 74 of age respondents are addicted on smoking (0.569%).



**Figure:-3** Age group of smoker participants.

**Table: 6.4.2 - Frequency and Percentage of smoking**

<b>Smoking(Frequency and Percentage)</b>		
	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Yes</b>	<b>195</b>	55.56%
<b>None</b>	<b>156</b>	44.44 %

We found that most of the respondents are smoker (55.56 %) and most of the respondents are Non-smoker (44.44 %).

## 6.5 History of Immunization status:

**Table: 6.5.1 - Number of participant’s immunization (Overall)**

<b>Immunization (overall)</b>		
<b>Non-Immunized</b>	<b>Immunized</b>	
54.126 %	45.874 %	
	<b>Single vaccinated</b>	<b>Multiple vaccinated</b>
	42.17 %	3.704 %

We found that most of the respondents are Vaccinated (45.874%) and most of the respondents are not Vaccinated (54.126%). Some of respondents are single Vaccinated (42.17%) and some of respondents are multiple Vaccinated (3.704%).

**Table: 6.5.2 – Vaccine name and percentage**

<b>Vaccine Name &amp; Percentage</b>									
<b>Influenza</b>		<b>Pneumonia</b>		<b>Tetanus</b>		<b>Hepatitis</b>		<b>MMR</b>	
<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>
0.855 %	99.145 %	00.0 %	100 %	57.55 %	42.45 %	3.419 %	96.581 %	00.0 %	100.0 %

Some of respondents are Immunized Influenza (0.855%), some of respondents are Immunized Tetanus (57.55%), and some of respondents are Immunized Hepatitis (3.419%).

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## 6.6 Medications:

**Table: 6.6.1 - Number of participant's Medication**

Medication	
<b>Medication</b> 61.2 %	<b>None</b> 38.8 %
<b>Single Medication</b> 41.0 %	<b>Multiple Medication</b> 20.2%

In the study, 61.2 % of the respondents take medication and 38.8% of the respondents do not take medication. Some of the respondents take single medication about 41.0% and some of the respondents take multiple medications about 20.2%. Out of 38.8% some of them are unable to take medication as because they are not capable to do so.

In this study, we found that taking medication for Asthma 6(1.7%) male, medication for Diabetes 6(1.7%) male, and medication for Hypertension 7(2.00%) male.

## 6.7 Medical illness and Condition

**Table: 6.7.1 - Number of participant's Medical illness and Condition**

Medical illness and Condition (overall)	
<b>No-Medical illness</b> 97 (27.6%)	<b>Medical illness</b> 254 (72.3%)
	<b>Single Medical illness</b> 91 (25.9%)
	<b>Multiple Medical illness</b> 163 (46.4%)

In our study we found that most of the respondents are suffering from medical illness (72.3%) and most of the respondents are not suffering from medical illness (27.6%). Some of respondents are suffering from single medical illness (25.9%) and some of respondents are suffering from multiple medical illnesses (46.4%).

In this study we found that some of the respondents are suffering from rheumatic fever 44(12.5%), some of the respondents are suffering from Asthma 14(4.00%), some of the respondents are suffering from Diabetes 11(3.1%), some of the respondents are suffering from skin disease 92(26.2%), some of the respondents are suffering from respiratory illness 4(1.1%), some of the respondents are suffering from gastric ulcer 57(16.2%), some of the respondents are suffering from hypertension 8(2.3%).

## 6.8 Symptom of Gastrointestinal problem:

**Table: 6.8.1 - Symptom of Gastrointestinal problem**

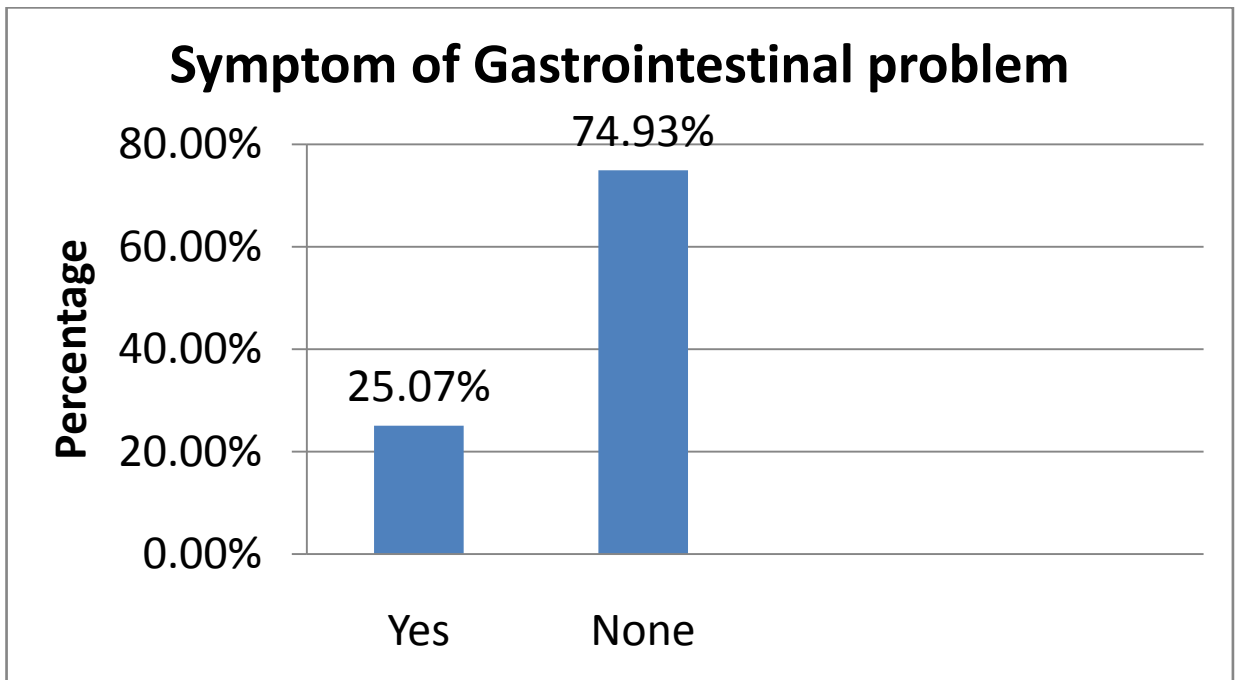
Gastrointestinal (Overall)	
Gastrointestinal problem	None
25.068 %	74.93 %
Single Gastrointestinal Symptom	Multiple Gastrointestinal Symptom
19.94 %	5.128 %

We found that most of the respondents are suffering from gastrointestinal problem (25.068%) and most of the respondents are not suffering from gastrointestinal problem (74.93%). Some of respondents are suffering from single gastrointestinal problem (19.94%) and some of respondents are suffering from multiple gastrointestinal problems (5.128%).

**Table: 6.8.2 - Percentage of Gastrointestinal problem**

Gastrointestinal													
Change in bowel movements		Nausea or vomiting		Painful bowel movements or constipation		Frequent diarrhea		Rectal bleeding or blood in stool		Stomach/abdominal pains or heartburn		Black or tarry stools	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1.140	98.86	0.855	99.15	2.564	97.44	2.849	97.15	20.80	79.20	3.419	96.58	0.570	99.43
%	%	%	%	%	%	%	%	%	%	%	%	%	%

Some of respondents are suffering from change in bowel movements (1.140%), some of respondents are suffering from change in nausea or vomiting (0.855%), some of respondents are suffering from painful bowel movements or constipation (2.564%), some of respondents are suffering from change in frequent diarrhea (2.849%), some of them are suffering from rectal bleeding or blood in stool (20.80%), some of them are suffering from change in abdominal pain or heart burn (3.419%) and some of them are suffering from black or tarry stools (0.570%).



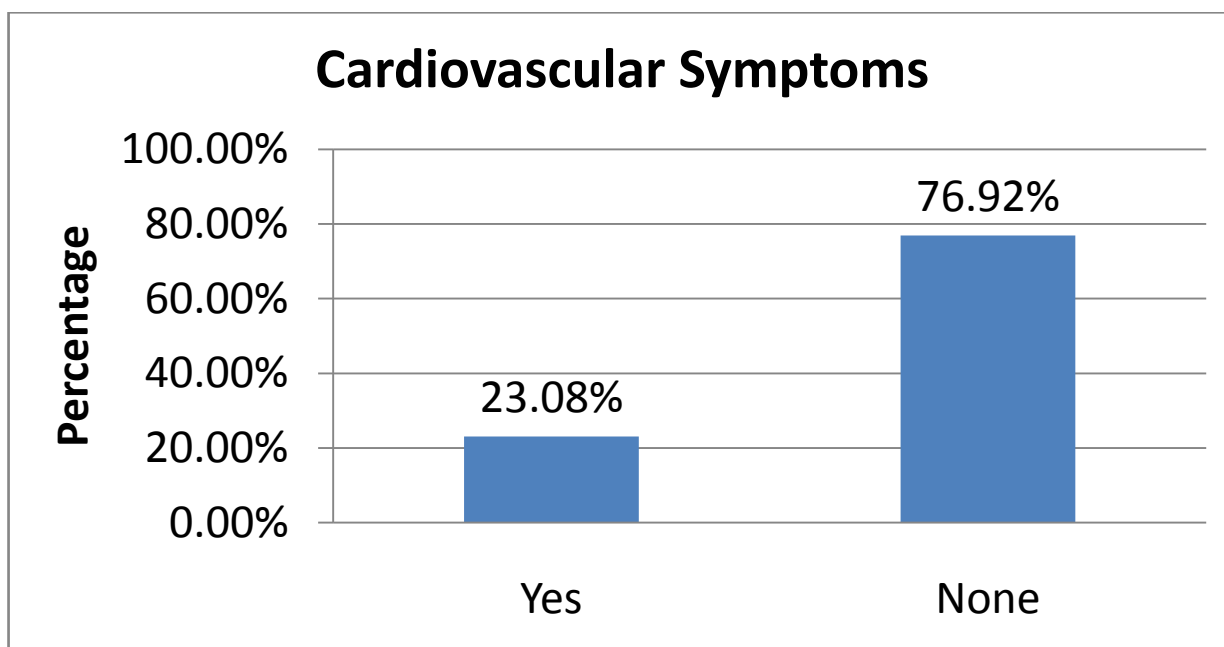
**Figure:-4** percentage of gastrointestinal symptom.

## 6.9 Cardiovascular Symptoms:

**Table: 6.9.1 – prevalence of cardiovascular symptoms**

Prevalence of Cardiovascular Symptoms (CVD)	
CVD Patient	None
23.079 %	76.921 %
Single CVD Symptom	Multiple CVD Symptoms
20.23 %	2.849 %

We found that most of the respondents are suffering from cardiovascular disease (23.079%). Some of them are suffering from single CVD symptom (20.23%) and some of them are suffering from multiple CVD symptoms (2.849%).



**Figure:-5** percentage of cardiovascular symptom.



**Table: 6.9.2 – percentage of cardiovascular symptoms**

Percentage CVD Symptom (overall)									
Heart trouble		Chest Pain or angina pectoris		Shortness of breath, walking or lying flat		Swelling feet, ankles or hand		Walking night with shortness of breath	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1.425 %	98.575 %	7.407 %	92.593 %	1.709 %	98.291 %	0.0 %	100.0 %	15.95 %	84.05 %

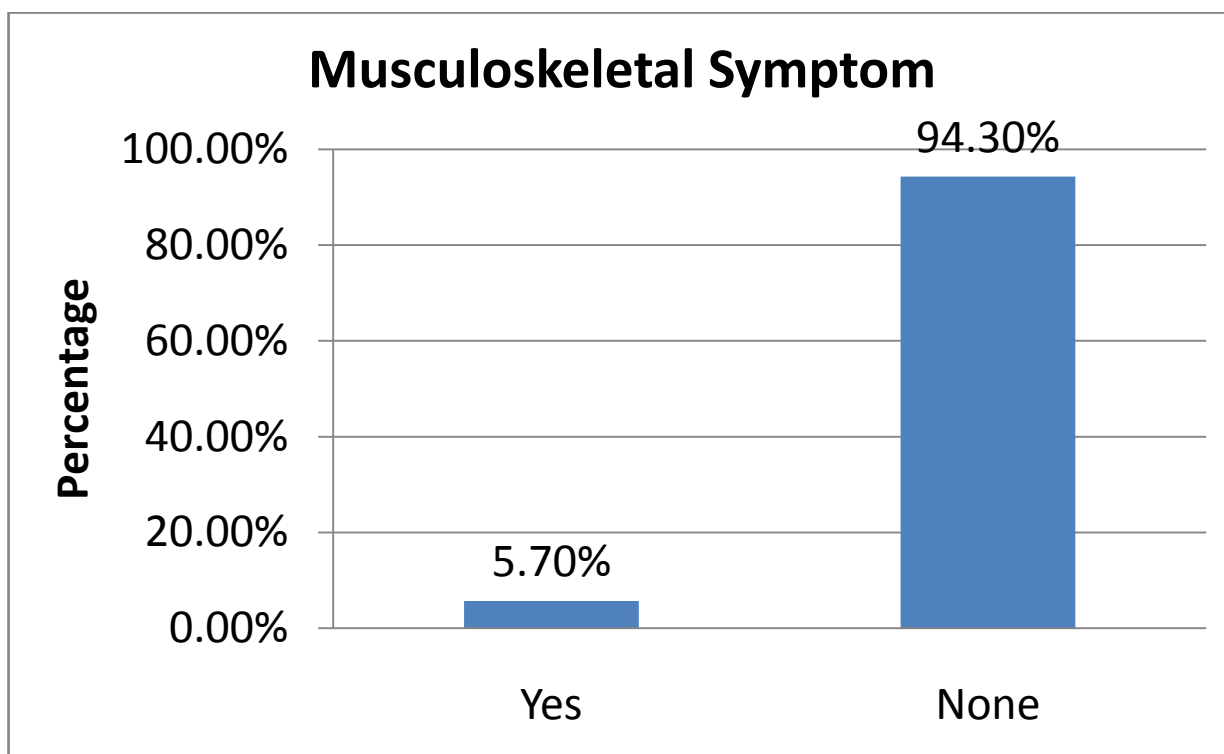
Some of them are suffering from Heart trouble (1.425%), Some of them are suffering from Chest pain or angina pectoris (7.407%), Some of them are suffering from Shortness of breath, walking or lying flat (1.709%), we did not found any swelling feet symptom within respondents and Some of them are suffering from Walking night with shortness of breath (1.425%).

## 6.10 Symptoms of Musculoskeletal:

**Table: 6.10.1 - Number of participant’s Musculoskeletal symptoms**

Musculoskeletal (Overall)	
Musculoskeletal problem	None
5.697 %	94.30 %
Single Musculoskeletal Symptom	Multiple Musculoskeletal Symptom
3.13 %	2.564 %

In the study we found that most of the respondents are suffering from musculoskeletal problem (5.697%) and most of the respondents are not suffering from musculoskeletal problem (94.30%). Some of respondents are suffering from single musculoskeletal problem (3.13%) and some of respondents are suffering from multiple musculoskeletal problems (2.564%).



**Figure:-6** symptom of musculoskeletal problem.

**Table: 6.10.2 – percentage of musculoskeletal symptoms**

Symptoms of Musculoskeletal problems			
Joint Pain		Back Pain	
Yes	No	Yes	No
3.134 %	96.87 %	4.558 %	95.44 %

Some of respondents are suffering from joint pain (3.134%) and some of them are suffering from back pain (4.558%).

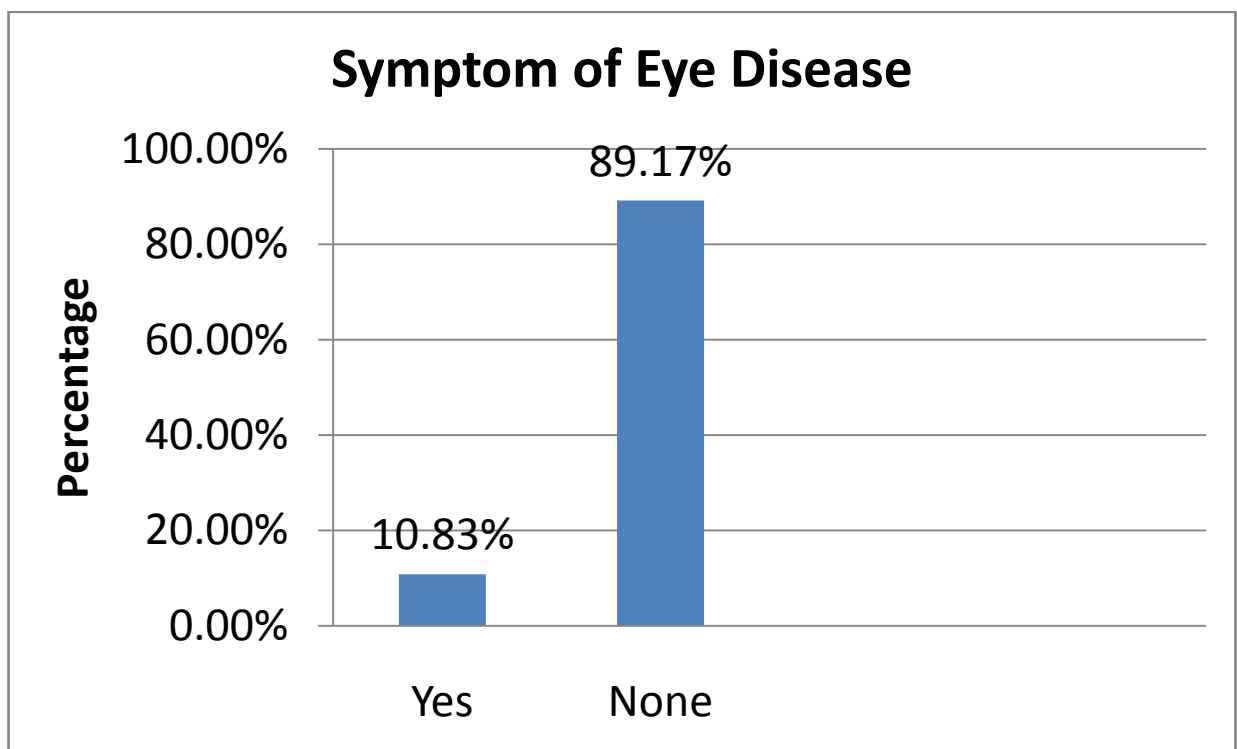
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## 6.11 Symptom of Eye Disease:

**Table: 6.11.1 – prevalence of Eye Disease Symptom**

Prevalence of Eye Disease (ED)	
ED Patient	None
10.827 %	89.17 %
Single ED Symptom	Multiple ED Symptom
9.687 %	1.140 %

We found that most of the respondents are suffering from eye disease (10.827%) and most of the respondents are not suffering from eye disease (89.17%). Some of respondents are suffering from single eye disease (9.687%) and some of respondents are suffering from multiple eye disease (1.140%).



**Figure:-7** symptom of eye disease.

**Table: 6.11.2 – percentage of ED symptom**

Percentage ED Symptom (overall)							
Change vision or blurred vision		Double vision eye		Disease or injury		Wear glasses	
Yes	No	Yes	No	Yes	No	Yes	No
10.54 %	89.46 %	00 %	100 %	0.285 %	99.715 %	1.140 %	98.86 %

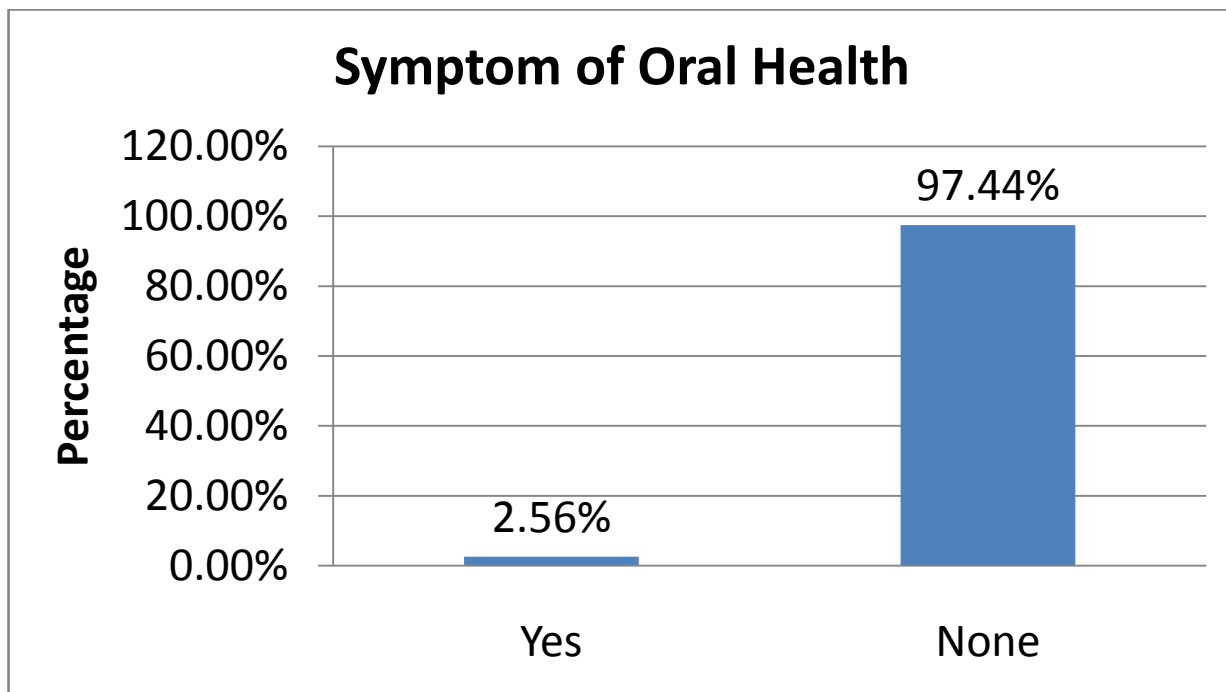
Some of them are suffering from change vision or blurred vision (10.54%) and some of respondents are suffering from disease or injury (0.285%) and some of them are suffering from wear glasses (1.140%).

## 6.12 Symptom of Oral Health:

**Table: 6.12.1 - Number of participant’s symptom of Oral health problem**

Oral Health	
Oral Health problem	None
2.56 %	97.44 %
Single oral Symptom	Multiple oral Symptom
2.275 %	0.285 %

We found that most of the respondents are suffering from oral health (2.56%) and most of the respondents are not suffering from oral health (97.44%). Some of respondents are suffering from single oral health (2.275%) and some of respondents are suffering from multiple oral healths (0.285%).



**Figure:-8** symptom of oral health.

**Table: 6.12.2 – percentage of oral health problems**

Symptoms of Oral Health problems			
Mouth sores		Bleeding gum	
Yes	No	Yes	No
2.279 %	97.721 %	0.570 %	99.43 %

Some of respondents are suffering from mouth sores (2.279%) and some of respondents are suffering from bleeding gum (0.570%).

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## Chapter Seven - Discussion

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The present study was designed to investigate the physical health of the tannery workers, mechanic workers, fish seller and cleaners. To measure physical health of the respondents the health measuring questionnaire, which was developed by the present investigator, was used.

Two aims and objective were formulated to test in this study. First posits to investigate overall physical health of the tannery workers, Fish sellers, Mechanic workers and Cleaners. Second posits to investigate which disease is most prominent among them.

A total of 351 (100 tannery workers, 51 cleaners, 100 fish sellers and 100 mechanic worker) participants was selected by purposive sampling method as subject for the present study. Some of participants were unmarried, married, widowed and their educational background was class V-HSC. All participants came from middle class family and monthly income was TK.6000- TK.12000. Their age range was 12 to 70 years.

In the study we found that most of the respondents are addicted (25.7 %) and most of the respondents are Non-addicted (73.2 %). Within this result some of respondents are addicted to Alcohol (**23.7 %**) and some of respondents are addicted to Marijuana (**4.2 %**). 15 to 24 of age respondents are addicted on Single drug (5.12 %) and Multiple drugs (0.284 %), 25 to 34 of age respondents are addicted on Single drug (11.11 %) and Multiple drugs (1.36 %), 35 to 44 of age respondents are addicted on Single drug (3.70 %)and Multiple drugs (1.424 %) , 45 to 54 of age

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respondents are addicted on Single drug (2.56%), 55 to 64 of age respondents are addicted on Single drug (0.854 %) and 65 to 74 of age respondents are addicted on Single drug (0.284 %).

In the study we found that most of the respondents are smoker (55.56 %) and most of the respondents are Non-smoker (44.44 %). 15 to 24 of age respondents are addicted on smoking (13.10%) , 25 to 34 of age respondents are addicted on smoking (25.64%), 35 to 44 of age respondents are addicted on smoking (10.26%) , 45 to 54 of age respondents are addicted on smoking (3.70%), 55 to 64 of age respondents are addicted on smoking (2.27%) and 65 to 74 of age respondents are addicted on smoking (0.569%)

In study we found that most of the respondents are Vaccinated (45.874%) and most of the respondents are not Vaccinated (54.126%). Some of respondents are single Vaccinated (42.17%) and some of respondents are multiple Vaccinated (3.704%). Some of respondents are Immunized Influenza (0.855%), some of respondents are Immunized Tetanus (57.55%), and some of respondents are Immunized Hepatitis (3.419%).

In the study, 61.2 % of the respondents take medication and 38.8% of the respondents do not take medication. Some of the respondents take single medication about 38.8% and some of the respondents take multiple medications about 20.2%.

In this study, we found that taking medication for Asthma 6(1.7 %) male, medication for Diabetes 6(1.7%) male, and medication for Hypertension 7(2.00%) male.



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In our study we found that most of the respondents are suffering from medical illness (72.3%) and most of the respondents are not suffering from medical illness (27.6%). Some of respondents are suffering from single medical illness (25.9%) and some of respondents are suffering from multiple medical illnesses (46.4%).

In this study we found that some of the respondents are suffering from rheumatic fever 44(12.5%), some of the respondents are suffering from Asthma 14(4.00%), some of the respondents are suffering from Diabetes 11(3.1%), some of the respondents are suffering from skin disease 92(26.2%), some of the respondents are suffering from respiratory illness 4(1.1%), some of the respondents are suffering from gastric ulcer 57(16.2%), some of the respondents are suffering from hypertension 8(2.3%).

In this study we found that most of the respondents are suffering from gastrointestinal problem (25.068%) and most of the respondents are not suffering from gastrointestinal problem (74.93%). Some of respondents are suffering from single gastrointestinal problem (19.94%) and some of respondents are suffering from multiple gastrointestinal problems (5.128%). Some of respondents are suffering from change in bowel movements (1.140%), some of respondents are suffering from change in nausea or vomiting (0.855%), some of respondents are suffering from painful bowel movements or constipation (2.564%), some of respondents are suffering from change in frequent diarrhea (2.849%), some of them are suffering from rectal bleeding or blood in stool (20.80%),

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some of them are suffering from change in abdominal pain or heart burn (3.419%) and some of them are suffering from black or tarry stools (0.570%).

In the study we found that most of the respondents are suffering from cardiovascular disease (23.079%). Some of them are suffering from single CVD symptom (20.23%) and some of them are suffering from multiple CVD symptoms (2.849%). Some of them are suffering from Heart trouble (1.425%), Some of them are suffering from Chest pain or angina pectoris (7.407%), Some of them are suffering from Shortness of breath, walking or lying flat (1.709%), we did not find any swelling feet symptom within respondents and Some of them are suffering from Walking night with shortness of breath (1.425%).

In the study we found that most of the respondents are suffering from musculoskeletal problem (5.697%) and most of the respondents are not suffering from musculoskeletal problem (94.30%). Some of respondents are suffering from single musculoskeletal problem (3.13%) and some of respondents are suffering from multiple musculoskeletal problems (2.564%). Some of respondents are suffering from joint pain (3.134%) and some of them are suffering from back pain (4.558%).

In this study we found that most of the respondents are suffering from eye disease (10.827%) and most of the respondents are not suffering from eye disease (89.17%). Some of respondents are suffering from single eye disease (9.687%) and some of respondents are suffering from multiple eye disease (1.140%). Some of them are suffering from change vision or blurred vision (10.54%)

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and some of respondents are suffering from disease or injury (0.285%) and some of them are suffering from wear glasses (1.140%).

In this study we found that most of the respondents are suffering from oral health (2.56%) and most of the respondents are not suffering from oral health (97.44%). Some of respondents are suffering from single oral health (2.275%) and some of respondents are suffering from multiple oral health's (0.285%). Some of respondents are suffering from mouth sores (2.279%) and some of respondents are suffering from bleeding gum (0.570%)

In explaining this finding it can be mentioned that workers are suffering various troublesome physical problem that are responsible for lowering their mental health. Because previous findings indicate that physical of an individual is interrelated. As a result in our study workers cannot cope with normal life cannot work productively and fruitfully and is not able to make a contribution to his or her family or community. Although all group of worker are sufferings from physical and mental health problems, yet it can be concluded that the intensity of health problems of the workers are higher than the other working environment.

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## **Chapter Eight – Conclusion**

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This study argues that the health of the workers can be affected by the environment, workplace, kinds of work, way of work, society and culture, and personal behaviors and lifestyle. The health problems of the workers involve a holistic process, rather than just one factor, and all factors are integrated with the workers' lives. The workers control machines and tools, and also the other way around, machines and tools control the workers' body. Therefore, the interior set up of the industry dominates the range of health problems of the worker, because the workers' first threat comes from the inside of the tannery where they work. Furthermore, outdoor environments, neighbors, society, culture and ecology influence the workers' body because they live in these variables. The physical body is the main asset for the workers. They invest it in order to achieve better lives. They emphasize on the visible body that they can use. To visualize the suffering of their body and everyday life. The common slogan of many disciplines, including public health, is that chemical exposure is very harmful for the body, or chemicals are dose-dependent substances. This paper illustrates that chemical and risk is a stagnant theme. Health problems of the workers are not only involving biological entity, but the creation of the respective society and culture. Society and culture create the working place conditions which have great impact on workers' health.

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## Chapter Nine – References

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