



Final Report



On

*Study of Occupational Health Risks Due to
Small Scale / Household Industries with More
Focus towards Children within Kathmandu
Valley*



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Dr. Sunil Kumar Joshi
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Executive Summary

Study Background

Making working conditions safe and healthy is in the interest of workers, employers and Governments, as well as the public at large. Although it seems simple and obvious, this idea has not yet gained meaningful universal recognition. Hundreds of millions of people through out the world are employed today in conditions that breed ill health and/or are unsafe.

In many jobs workers are exposed to a combination of potential hazards. Both research and legislation usually considers factors in isolation and we currently have little knowledge of the impact of combinations of factors on health and performance efficiency. This study was addressing the issue of combined effects of occupational health hazards with reviewing the literature, conducting appropriate secondary analyses of existing databases, collecting new data on accidents at work, and carrying out studies of the effects of combinations of potential stressors on physiological functioning and performance efficiency.

The study focused on children (under 16 years) who were vulnerable to various social, physical and psychological impacts of their works; and there was a need to identify the occupational hazards to which children were exposed in various sectors of employment. Adequate steps should be taken to protect these children from these occupational health hazards.

The principle objective of this research was to obtain first hand information on Occupational health risks in Small-Scale/ Household Industries in Kathmandu valley. The study was focused on identification and evaluation of the environmental factors which may affect the workers' health, assessment of conditions of occupational health and factors in the organization of work which may give rise to risks for the health of workers and assessment of collective and personal protective equipment (PPE).

The main components of the study were:

Workplace Occupational Health Assessment of ten small scale / household industries under operation.

- Baseline data survey on household characteristics, education level, number of family members including children, total monthly income, alcohol and smoking habit, fuel type used, previous employments, accidents and diseases etc.
- Health response assessment which included medical examination of the children less than 16 years of age, data acquisition on health effects through questionnaires; computation of disease prevalence, subjective complaints on health effects prevalence etc.
- Recommend measures to reduce occupational health hazards and child labour

The main activities carried out included the following:

- A procedural Guideline has been identified to analyse occupational health risks in small scale and household industries in Nepal.
- Workplace Occupational Health Assessment was done in ten small scale / household industries under operation within the Kathmandu Valley.
- Around 545 structured questionnaires were used to gather data on socio-economic status and previous occupational history of the employees working in those industries.
- Thorough medical examination of around 135 child workers was done using a structured questionnaire to find out the health effects due to occupational hazards.

The key findings of the study were:

- The occupational health and safety practices in small scale/house hold industries in Kathmandu has been found to be insignificant, out of the ten industries only few industries have been practicing some occupational health

and safety practices, the over all scenario is quite vulnerable. The occupational health and safety service in Nepal is still in the developmental stage.

- National Statistics concerning Occupational Health and Safety (OHS) is inadequate and gather information mainly from secondary sources and there is no proper primary data collection system in place. So, the problem of under-reporting and miss reporting cannot be ruled out. The occupational accident and injury statistics are difficult to obtain.
- Majority of the workers in those industries were working on a low salary and with daily drinking habits.
- Child labour is a serious problem in our country. Out of ten industries, six have employed child labours and the working conditions range from bad to terrible. Out of total 545 workers present in the industries under study, altogether 135 (24.8%) were child workers. And, significantly higher proportion of child workers (97%) was illiterate compared to 3% of children with primary level education. Among 135 child workers, 23 (17%) were girls.

Health Responses:

- Except for lower respiratory tract infection (LRI), the prevalence of all diseases has been found to be significant. The highest prevalence was found to be 53.3 % for ear problem where as 49.6% and 38.5% were suffering from others and URI respectively. Also 37% of the respondents had nose problems.
- The prevalence of eye problem was very high among the child workers from stone crushing (48%) and brick kiln (45.7%) industries.
- Suffering from ear problems was very significant in almost all types of industries, being highest in the construction industry (66%).
- The prevalence of skin problems like eczema, dermatitis was highest among the child workers in the metal industry (70%) followed by brick kiln industry (51.4%).

- The prevalence of LRTI is relatively low compared to other diseases, stone crushing industry being at the top (24%).
- URTI, abdominal problem and musculoskeletal problem were highest among the children working in stone crushing (60%), embroidery (83%) and carpet (50%) industries respectively.
- Out of 32 child workers from the studied carpet industry, 25 children were suffering from scabies.
- The major health effects (subjective complaints) induced by the hard physical work was observed as fatigue, general body ache, headache, irritation, weakness, sleep disturbance and depression.

Conclusion

We must focus on appropriate strategies to reach our objective of eliminating child labour. Ratifying international conventions or introducing new legislation is not the answer to the problem. We must identify the strategies to prevent children from working, to withdraw more children from employment and to sustain such withdrawals. If we fail or delay our task to launch appropriate programs, the situation of working children will never be solved.

Recommendations for the improvement of OHS scenario in Nepal

- Strengthening of National policies for health at work and development of policy tools
- Development of healthy work environment
- Development of healthy work practices and promotion of health at work
- Strengthening of Occupational Health Services
- Establishment of support services for occupational health
- Development of occupational health standards based on scientific risk assessment

- Development of human resources for occupational health
- Establishment of information systems
- Strengthening of research
- Development of collaboration in occupational health and with other activities

Recommended measures for the reduction of child labour

- Research and Study
- Policy and Institutional Development
- Legislation and Enforcement
- Advocacy, Networking and Social Mobilisation
- Education and Health
- Income and Employment Generation
- Protection
- Rehabilitation

Abbreviation

AIDS	Acquired Immune Deficiency Syndrome
BEM	Biological Effect Monitoring
CO	Carbon Monoxide
CWIN	Child Workers in Nepal Concerned Centre
ENPHO	Environment and Public Health Organization
ENT	Ear, Nose and Throat
HCs	Hydrocarbons
HIV	Human Immune Deficiency Virus
HMG	His Majesty's Government
ILO	International Labour Organization
IPEC	International Programme on the Elimination of Child Labour
LEV	Local Exhaust Ventilation
LRTI	Lower Respiratory Tract Infection
MTO	Mineral Turpentine Oil
NESS	Nepal Environment and Scientific Studies
NHRC	Nepal Health Research Council
NO _x	Oxides of Nitrogen
OEL	Occupational Exposure Limit
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
SO ₂	Sulphur Dioxide
TOR	Terms of Reference
URTI	Upper Respiratory Tract Infection
UV	Ultraviolet
VOC	Volatile Organic Compound
WHO	World Health Organization

1.0 INTRODUCTION

This report on “Study of Occupational Health Risks Due to Small Scale / Household Industries with More Focus towards Children within Kathmandu Valley” has been prepared as per the contract agreement and TOR provided by Nepal Health Research Council (NHRC) to the Principal Investigator of this Project.

This project work is a part of the ongoing NHRC programs on Environmental Health issues. The main objective of this study is to identify procedural guidelines to analyze occupational health risks in small scale and household industries in Nepal and to suggest ways and means for minimizing major occupational health risks.

Occupational Health is a multifaceted activity concerned with the prevention of ill health in employed populations. This involves a consideration of the two-way relationship between work and health. It is as much related to the effects of the working environment on the health of workers as to the influence of the workers' state of health on their ability to perform the tasks for which they were employed. Its main aim is to prevent, rather than cure, ill health from wherever it arises in the workplace. A joint International Labour Organization/World Health Organization (ILO/WHO) Committee defined the subject back in 1950 as: ‘the promotion and maintenance of highest degree of physical, mental and social well being of workers in all occupations’.

International Labour Organization (ILO) has estimated that approximately 250 million workers meet occupational accidents and 160 million people suffer with occupational diseases each year. Further, approximately 2 million people die prematurely of occupational accidents and diseases each year worldwide. It is estimated that in Nepal, each year approximately 2000 workers meet workplace accidents and because of which about 200 lives are lost (Occupational Health and Safety Project, MoL&TM). These losses due to these workplace accidents and diseases are not a loss merely to the industries but physical and economic loss to the society and the nation as well.

Occupational health care is believed to develop as a consequence of the industrial revolution and has a wider dimensions limiting not only to the activities performed by the occupational health service. It is multidisciplinary and multi sectoral activity involving in addition to occupational health professionals other specialists both in the enterprises and outside, as well as the competent authorities, the employers, workers and their representatives.

Occupational health care, while primarily targeting the prevention of harmful effects from work, also has a positive economic impact on both national and enterprise level, and thus may be regarded as a productive factor, rather than an

economic burden. If future business success is to depend increasingly upon well-qualified, motivated, efficient and healthy employees, modern comprehensive occupational health strategies (safety, health protection, promotion of welfare and health, competence and personality development) can significantly contribute to prepare employees and companies to meet the challenges of the future.

There are risks of accidents and diseases in any occupational setting where men and machine are involved. The causes of these accidents pertain to unsafe work, machine, equipment, material and/or unsafe acts. These causes of accidents and diseases present in the work and workplace may develop fear and physical and mental stress in workers. This in effect may result in loss of production and productivity.

The main focus of occupational health is on three different objectives:

- (i) the maintenance and promotion of workers' health and working capacity
- (ii) the improvement of working environment and work to become conducive to safety and health
- (iii) development of work organizations and working cultures in a direction which supports health and safety at work

It aims to promote a positive social climate and smooth operation, and enhancing the productivity of the enterprises.

1.1. CLASSIFICATION AND SCALE OF INDUSTRIES IN NEPAL:

The HMG of Nepal has classified and scaled the industries as stated below for the purpose of industrial administration and facilities. (Industrial Policy, Nepal)

Classification:

1. Manufacturing Industries:

Industries which produce goods by utilizing or processing raw materials, semi-processed materials, by-products or waste products,

2. Energy Based Industries:

Industries generating energy from water resources, wind, solar, coal, natural oil and gas, bio-gas or any other sources.

3. Agro and Forest-Based Industries:

Business mainly based on agriculture and forest such as integrated sericulture and silk production, horticulture and fruit processing, animal husbandry, poultry farming, fishery, tea gardening and processing, coffee farming and processing, herbiculture and herb processing, vegetable seed farming, floriculture, agro-forestry, community and private forestry etc.

4. Mineral Industries: Mineral excavation, processing.

5. Tourism Industries:

6. Service Industries:

Workshops, printing press, consultancy services, ginning and baling businesses, cinematography, construction business, public transportation, photography, hospital and nursing home, educational institutions, laboratory, air service, cold storage, etc.

7. Construction Industries:

Road, bridge, tunnel, ropeway, flying bridge, railway, trolley bus and office, commercial and residential complex etc.

Division of Scale:

1. Traditional Cottage Industries:

The traditional industries mobilizing specific skill or local raw material and resources and labour intensive and related with national customs, arts and culture.

2. Small Industries:

Industries other than traditional cottage industries with a fixed capital investment not exceeding Rs. 30 million.

3. Medium Industries:

Industries with a fixed capital investment between Rs. 30 million and Rs. 100 million.

4. Large Industries: Industries with a fixed capital investment more than Rs. 100 million.

1.1.1 WORKFORCE IN SMALL SCALE/HOUSEHOLD INDUSTRIES

Small Scale & Household Industries employ on average nearly 40% of the workforce in the industrialized countries and up to 60% of the workforce in developing and newly industrialized countries. Small Scale & Household Industries are gaining importance in national economies. They are employment-intensive, flexible in adapting to rapidly changing market situations, and provide job opportunities for many who would otherwise be unemployed. Their capital requirements are often low and they can produce goods and services near the consumer or client.

The workforce of Small Scale and Household Industries is characterized by its diversity. In many instances, it comprises the manager as well as members of his or her family. Small Scale and Household Industries provide entry to the world of work for young people and meaningful activities to elderly and redundant workers who have been separated from larger enterprises. As a result, they often expose such vulnerable groups as children, pregnant women and the elderly to occupational health risks. Further, since many Small Scale and Household Industries are carried out in or near the home, they often expose family members and neighbours to the physical and chemical hazards of their workplaces and present public health problems through contamination of air or water or of food grown near the premises.

The educational level and socio-economic status of Small Scale and Household Industries workers vary widely but are often lower than the averages for the entire workforce. Of particular relevance is the fact that their owners/managers may have had little training in operation and management and even less in the recognition, prevention and control of occupational health risks. Even where appropriate educational resources are made available, they often lack the time, energy and financial resources to make use of them.

Like all other aspects of Small Scale and Household Industries, their working conditions vary widely depending on the general nature of the enterprise, the type of production, the ownership and location. In general, the occupational health and safety hazards are much the same as those encountered in larger enterprises, but as noted above, the exposures to them are often substantially higher than in large enterprises.

Although very few studies have been reported, it is not surprising that surveys of the health of workers in Small Scale and Household Industries in such industrialized countries as Finland (Huuskonen and Rantala 1985) and Germany (Hauss 1992) have disclosed a relatively high incidence of health problems, many of which were associated with lowered capacity for work and/or were work-related in origin. In the Small Scale and Household Industries in developing countries an even higher prevalence of occupational diseases and work-related health problems has been reported (Reverente 1992).

1.2. OCCUPATIONAL HAZARDS

1.2.1. Occupational Hazards and Health Effects:

Millions of workers in both developed and developing countries are at risk from exposure to physical, chemical, biological, psychosocial or ergonomic hazards in the workplace. For many of these people there is often the risk of combined exposures to different occupational hazards.

It is estimated that approximately 30% of the workforce in developed and between 50% and 70% in developing countries may be exposed to heavy physical workloads or ergonomically poor working conditions, which can lead to injuries and musculoskeletal disorders. Physical hazards, which can adversely affect health, include noise, vibration, ionizing and non-ionizing radiation, heat and other unhealthy microclimatic conditions. Between 10 and 30% of the workforce in industrialized countries and up to 80% in developing and newly industrialized countries are exposed to a variety of these potential hazards. Exposure to biological agents – viruses, bacteria, parasites, fungi and moulds – occurs in many occupational environments from agriculture to offices. The Hepatitis B and C viruses, HIV/AIDS infection and tuberculosis (particularly among healthcare workers), and chronic parasitic diseases (particularly among agricultural and forestry workers) are some of the most common occupational diseases resulting from such exposures. (Swuste. P et al. 1995)

Thousands of toxic chemicals pose serious health threats potentially causing cancer, respiratory and skin diseases as well as adverse effects on reproductive function. Workers can be and often are exposed to hazardous chemical agents such as solvents, pesticides and metal dusts.

Workers are also at risk of being exposed to various types of mineral and vegetable dusts. For example, silica, asbestos and coal dust cause irreversible lung diseases, including pneumoconiosis. Known since the time of Hippocrates, silicosis is still the most widespread occupational lung disease.

Silicosis can predispose workers to tuberculosis and lung cancer; it is progressive and incurable but preventable. Vegetable dusts can cause a number of respiratory conditions (such as byssinosis) and allergic reactions as asthma. The risk of *cancer* from workplace exposure is of particular concern. Around 350 chemical substances have been identified as occupational carcinogens. They include benzene, hexavalent chromium, nitrosamines, asbestos and aflatoxins. In addition, the risk of cancer also exists from exposure to physical hazards such as ultraviolet (UV) and ionizing radiations. The most common occupational cancers include lung, bladder, skin and bone cancer, leukaemia and sarcomas. Though it is very difficult to achieve information about details concerning carcinogens in the industries in Nepal, there seems to be a large number of workers who are

exposed to different carcinogens in a large number of industries and the incidence of cancer is thought to be increasing every year in our country. In a case control study done in Nepal, a high risk (OR 4.2 CI: 1.4, 12) for lung cancer was found among the workers, who have worked in the exposed occupations. (Joshi SK et al., 2003 and Joshi SK, 2003) Exposure to thousands of allergenic agents, including vegetable dusts, is a growing cause of work-related illness. A large number of allergens have been catalogued which can cause skin and respiratory diseases (e.g., asthma). The number of these disorders is increasing steadily worldwide.

Social conditions at work, which raise serious concerns about stress, include inequality and unfairness in the workplace; management style based on the exclusion of workers from the decision-making process; lack of communication and poor organization of work; strained interpersonal relationships between managers and employees. Stress at work has been associated with elevated risks of cardiovascular diseases, particularly hypertension and mental disorders.

Occupational health problems are found essentially in agriculture and other types of primary production. Heavy physical work, often combined with heat stress, pesticide poisoning and organic dusts, is frequently aggravated by non-occupational factors such as chronic parasitic and infectious diseases. Poor hygiene and sanitation, nutritional problems, poverty and illiteracy heighten the risk of disease and/or occupational injury.

Accidents and physical and chemical agents are the main problems in manufacturing industries, while pesticides and organic dusts, heavy physical work, biological factors and accidents are the occupational burdens of agricultural workers. A number of studies show that in the worst 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 industrial countries (WHO 1995).

Small-scale industrial and household enterprises often have fewer resources, heavy workloads and multiple tasks for each worker. Work usually takes place in an environment that does not always meet required standards. Family members of the entrepreneurs and workers, including children, pregnant women and elderly people, share the work in small-scale enterprises, such as home industries, small farms and cottage industries.

1.2.2. Types of Occupational Hazards

a. Mechanical Hazards

Mechanical factors, unshielded machinery, unsafe structures at the workplace and dangerous unprotected tools are among the most prevalent hazards in both industrial and developing countries. They affect the health of a high proportion of the workforce. Most accidents could be prevented by applying relatively simple measures in the work environment, working practices, and safety systems and ensuring appropriate behavioural and management practices. This would significantly reduce accident rates within a relatively short period of time. Accident prevention programmes are shown to have high cost-effectiveness and yield rapid results. However, unfortunately, ignorance of such precautions, particularly in sectors where production has grown rapidly, has led to increasing rates of occupational accidents.

Prevention is the only sustainable strategy for controlling the accident epidemic. Some countries can demonstrate very positive effects of accident prevention programmes.

b. Chemical Hazards

About 100,000 different chemical products are currently in use in work environments, and the number is increasing constantly. The extent of exposure varies widely according to the industry, activity and the country.

Metal poisoning, solvent damage to the central nervous system and liver, pesticide poisoning, skin and respiratory allergies, cancers and reproductive disorders are among the health effects of such exposures. Pesticide exposure is the major chemical hazard in developing countries where personal protection is particularly difficult and other preventive means should be implemented. The major threat posed by pesticides in many developing countries is acute poisoning itself. A recent estimate by the WHO puts the annual number of severe poisonings at 3 million, with about 220,000 deaths.

c. Biological Hazards

Many biological agents, viruses, bacteria, parasites, fungi, moulds and organic dusts have been found to occur in occupational exposures. In the industrial 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 (particularly among agriculture and forest workers) are the most common occupational diseases that result from such exposures (WHO 1995).

d. Physical Hazards

Workers may be exposed to several physical factors such as noise, vibration, ionizing and non-ionizing radiations and microclimatic conditions that are known to affect their health. Noise-induced hearing is one of the most prevalent occupational diseases in both developing and industrial countries, although many preventive means are available. Preventive strategies have also been developed for other physical factors, particularly for localized vibration and ionizing radiation.

e. Psychosocial Hazards

Up to 50% of all workers in industrial countries judge their work to be “mentally heavy”. Psychological stress caused by time pressure, hectic work, and risk of unemployment has become more prevalent during the past decade. Other factors that may have adverse psychological effects include jobs with heavy responsibility for human or economic concerns, monotonous work or work that requires constant concentration. Others are shift-work, jobs with the threat of violence, such as police or prison work, and isolated work. Psychological stress and overload have been associated with sleep disturbances, burn-out syndromes, stress, nervousness and depression. There is also epidemiological evidence of an elevated risk of cardiovascular disorders, particularly coronary heart disease and hypertension.

1.3. SITUATION OF OCCUPATIONAL HEALTH IN NEPAL:

Nepal has been the member of International Labour Organization since 1966. It has ratified seven ILO Conventions on Occupational Health and Safety on Weekly Rest (No. 14), right to organize and bargain collectively (No. 98), equal remuneration (No. 100), discrimination (employment and occupation) (No. 111), and minimum wage fixing (No. 131), minimum age for admission to employment (no. 138), and tripartite consultation (no. 144). The Government of Nepal is committed to enhance working conditions at workplaces and to improve the occupational safety and health of the workers in Nepal. The Labour Act of 1992 provides basic requirements for Occupational Safety and Health to be implemented in industrial establishments. The act provides for adequate ventilation, lighting and washing facilities, and safe arrangement of equipment, health provisions, proper labelling of materials, and first-aid care. A number of regulations and technical standards are necessary to be issued in order to specify measures to be taken. In 1996, the National Occupational Safety and Health Project was set up, and its activities were started.

Industrialization is one of the important foundation stone for the development of a country. It has become a global phenomenon and has emerged as one of the major economic activities and a common indicator of development. For the sustainability and continued development of industrialization, it is essential to

have increased production and enhanced productivity. Safe work and workplace is the complementary base for increased production and enhanced productivity. With the vision of developing promotion and protection of safe work and workplace as the complementary fundamental aspect of any industrial occupation, His Majesty's Government of Nepal, Ministry of Labour and Transport Management established the Occupational Safety and Health Project in 1996. Though the establishment of Occupational Safety and Health Project dates back almost to a decade, but no significant work in the realm of occupational safety has been administered.

Since Nepal has not yet ratified the ILO Convention No. 155, Occupational Safety Health, but after the restoration of multi-party system in Nepal, His Majesty's Government of Nepal has begun to pay more attention on industrial working condition and environment by enacting and enforcing the new Labour Act, 2048 (1992). There is an urgent need to formulate acts and laws, code of practice, guides, instructions and standards for the promotion of safety and health at work and workplace in Nepal.

The identified causes of occupational accidents in Nepal can be described as under:

- Unsafe working conditions
- Lack of supervision & training
- Use of old machinery & equipment
- Lack of sufficient maintenance
- Bad house-keeping practices
- Violation of safety rules
- Over crowded production unit with very congested space

High risk for health and safety has been observed in Nepal as under:

- Working with machine & equipment
- Use of electricity
- Building & construction works
- Use of chemicals in industries, various services and agriculture
- Dusty worksites

- Congested & dark workplaces

The identified main causes leading to minimal Occupational health and safety in Nepali industries are:

- Lack of knowledge & awareness among workers
- Lack of awareness and commitment in employers & management
- Fear of change and of cost increase (Management)
- Poor consultation system
- Majority of untrained people both in management & labour)
- No safety-friendly work culture (both workers & management)
- Lack of research & data-base on occupational diseases and health hazards

The concept of working conditions, occupational safety and health of the workers is quite a new concept even to the oldest industries of Nepal. Though there were some studies in relation to different aspects of the different industry but the specific study on working conditions, occupational safety and health so far has not conducted except the jute industry of Nepal. Thus a many industries, which are prone to health hazard, or many have problems of occupational safety and health is yet to be studied.

The causes of industrial accidents are varied but the major cause of most of the accidents has been noticed to be the negligence of the workers in the workplace of the industries. The negligence of the workers is mainly due to continuously repetitive nature of the job or to lack of awareness. Among the other causes, the violation of safety rules is the major one. The other major causes are lack of upgrade training, emotional status of the workers, lack of supervision, use of old or outmoded machine or equipment, poor layout, congested working places and unsuitable working conditions. Similarly, there is no indulgence of any kind for installing safety and health devices to replace worn out and unsafe machinery or to provide occupational health diagnosis and treatment facilities in the industries. So far safety measures adopted by the establishments to avoid accident are concerned, they are limited to supervision from time to time, regular repair and maintenance of tools, equipment and machinery and providing necessary safety equipment such as goggles, boots, and gloves etc.

1.4. CHILD LABOUR IN NEPAL

In most families, as soon as the children are old enough to contribute, they are expected to work. This may involve helping with housekeeping chores, running errands or caring for younger siblings—in general, helping with the traditional homemaking responsibilities. In farming families or those engaged in some form of home industry, children are usually expected to help with tasks suited to their size and capabilities. These activities are almost invariably part-time, and often seasonal. Except in families where the children may be abused or exploited, this work is defined by the size and “values” of the particular family; it is unpaid and it usually does not interfere with encouragement, education and training. This report does not address such work. Rather, it focuses on children under the age of 16 who work outside the family framework in one industry or another, usually in defiance of laws and regulations governing the employment of children.

1.4.1 Definition of Child Labour

Despite several international conventions, national legal instruments and a vigorous exercise of national and international organisations in last one decade, there is still confusion in understanding of the term “child labour”. A succinct and pragmatic working definition of child labour is thus imperative, so that it is understood the same by all, consistently. The ILO definition (1983) on child labour is by far the most widely accepted definition. It states “Child labour includes children prematurely leading adult lives, working long hour for low wages under conditions damaging to their health and their physical and mental development, sometime separated from their families, frequently deprived of meaningful education and training opportunities, that could open up for them a better future.”

The UN Convention on the Rights of the Child (CRC) and the latest ILO Convention on child labour, Convention 182 define a child to be a person of age below 18 years. However, there is also room left up to individual countries to be flexible. The ILO Convention 138 provides minimum working age to be 15 years or 14 years, for developed and developing economies, respectively.

Different legislation in Nepal, have defined children with different age limits. Earlier, the Labour Act – 1992 defined “ketaketi” (children) to be of age less than 14 years and Children Act - 1992 defined “balak” (a child) to be less than 16 years. The Labour Act also defined a term “nabalik” (a minor) to be of age between 14 to 18 years.

However, the Child Labour (Prohibition & Regularisation) Act – 1999 defines “balak” (a child) to be of age less than 16 years and amends the definition of Ketaketi in the Labour Act. Therefore, as per the national laws, a child is defined as a person less than 16 years old and a minor is of age between 16 to 18 years. (National Master Plan on Child Labour, 2001)

1.4.2 Scenario of Child Labour in Nepal

Some information of child labour in the age groups 10-14 years and 15-18 years is available in the Population Census reports. But the status of children of age groups below 10 years is not available in the Census. When defining child labour one must distinguish between child labour and child work. When work is damaging to a child's physical or psychological health or interferes with schooling and a stress-free environment, such work must be considered as child labour. When work has a positive impact on the child and is part of socialization, growing up, and mastering responsibility, such work should be defined as child work. In short, exploitative child work is child labour.

Table 1-Economically Active Children and Child Labour in Nepal (in '000)

	6-9 years			10-14 years			6-14 years		
	Total	Boy	Girl	Total	Boy	Girl	Total	Boy	Girl
Total Children	2195	1118	1077	2522	1276	1246	4717	2393	2324
Economically Active Children (%)	24.1	19.7	28.7	26.7	21.1	33.1	25.5	20.5	31.2
Economically Active Children	529	220	309	673	269	412	1203	491	725
Child Labour (%)	1.9	1.2	1.6	6.4	6.8	6	4.4	4.8	4
Child Labour	42	25	17	162	87	75	208	115	93

Source: Situation Analysis of Child Labour, UNICEF

Table 2: Economic activity participation rate of children (10-14) by ecological region, Nepal 1981-2001.

Regions	Census Years								
	1981			1991			2001		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
Mountain	68.5	68.0	69.0	39.8	25.9	54.5	46.8	42.5	51.2
Hills	60.2	60.7	59.7	26.4	17.3	35.9	28.3	25.8	30.9
Terai	50.9	60.6	39.0	16.2	17.6	14.6	26.7	26.6	26.8

Source: Population Census 1981, 1991, 2001.

Rampant poverty, mass illiteracy and lack of awareness to educate and prepare children for future have created a situation in which child labour has become the most disadvantaged population group in Nepal. On the other hand, quest for cheap labour by employers, be they farms, households or industries has been responsible for deplorable situation of children working for wage. Literacy rate among children of age 6-14 years is only 55 percent in Nepal. In fact, only about half of children in the age group attend schools, the remaining work as domestics and in farms, and are engaged in paid employment.

The identified causes of child labour in Nepal are the following:

- o Poverty
- o Failure of the education System
- o Informal economy
- o Low cost of child labour
- o Lack of social Protection

- o Social customs and attitudes

The recent political instability, insurgency and carnage has also triggered the incidence of child labour in Nepal, many people from different parts of the country have fled from their villages and communities to either bordering India or to some urban centre of Nepal seeking shelter and protection. The only choice left for them was either to join the Maoist rebels and fight for them for their purpose or to flee from their villages, they choose the second one. The children along with their parents are left with no choice but to work for earning their livelihood. The Consultants came across along many children working in the industries labelling themselves as “the victims of the Maoist problem”.

Child labour can be divided into two categories:

(a) Self-employed: working at own home looking after younger children, doing house work or working in family occupations to help parents. While this type of work may not pose any health hazards, it can deprive the children of opportunities for education and development.

(b) Employed for wage: gainfully employed outside the home. Away from parental care, child labour of this type is vulnerable to economic, physical and sexual exploitation. In rural areas, children are mostly hired for agricultural and livestock's tending purposes. In urban areas, the practice of hired child labour is rampant in service sector, which includes restaurants and domestic works, and as industrial workers where tender finger and repetitive work is required.

Child labour cannot be viewed in isolation, because this is a cause and consequence of the country's socio-economic and political reality. Child labour is not a new phenomenon in an agriculturally dominant country like Nepal. Since years ahead, it has been remained as a part and parcels of the feudal economy. The rural communities in Nepal are living under the state of social injustice, economic exploitation, deprivation and backwardness. The growing marginalization among the rural population, landlessness, unemployment and unplanned urbanization have also contributed to an increase in the magnitude of child labour exploitation in the country. The constant poverty, unemployment and lack of basic needs in the villages force the parents to send their children to work in the cities for additional income for family subsistence. Experiences have proved that on the one hand, family and parents are forced to send their children to work due to poverty and on the other, most of them are not aware of the consequence of child labour problem. Farming, plantation, cattle grazing and agriculture bonded labour are most common form of child labour in rural areas whereas factory works, domestic services, construction works, scavenging, transportation works are quite often seen in the urban areas. In addition, a number of new areas of child labour have been seen both in rural and urban areas with every passing year in Nepal. This is closely interlined with various other socio-economic and political problems of the country. Landlessness, poor

access to resources and production, gender inequity, in-equitable distribution of land, unemployment, lack of people-centred and sustainable development programme and environmental degradation are the under-lying factors for the child labour problem in Nepal.

According to a nationally representative sample survey conducted by the Central Department of Population Studies of the Tribhuvan University, there are 2.6 million children between the ages of 5-14 years who are economically active. This constitutes 29.1 per cent of the total estimated population of the country. They are living and working in the most health hazardous and dangerous situation. Nowadays, pushed by the poverty and deprivation, many children are migrating to the urban areas, and this has ultimately contributed to an overwhelming increase of the magnitude of child labour in the cities. A majority of children are employed in informal sectors. Carpet and garment industries, confectionery, brick kilns, roads and building construction, transportation and stone quarries are major child labour employing agencies in Nepal. Similarly, thousands of children are being employed in mines, factories, and domestic service. The reasons for this are that children are a cheap source of labour, and they are weak and uncomplaining.

1.4.3 Some Identified Forms of Child Labour in Nepal

Many different forms of child labour are present in Nepal. Fifteen main areas of work have been identified, as follows (CWIN, 2004)

a. Factory/Industries:

Carpet- mostly child migrants work in this area. The children work an average of 15 hours a day, with only one hours' break, 7 days a weeks. The conditions in which the children work are usually poor. Damage to health and injuries are commonplace. Trafficking of children to work in carpet factories in India also occurs. Other forms in this category include: garments/textiles, handicrafts, printing press, welding, confectionery and bakery, making matches, pottery and brick kilns.

b. Mines and quarry:

It is estimated that more than 10,000 children work in stone quarries, coal mines, sand mines and red soil mines in Nepal, and a majority of them are between 11 to 13 years of age. 25% of them work 4 to 8 hours a day, 67% work 9 to 10 hours a day, for what 90% of these children earn less than Rs.60 a day, and 30% earn less than Rs.20 a day They are paid very poorly, many do not attend school and most of them are young girls. (ILO 2005)

c. Plantation/Agriculture:

Children are involved planting a variety of different substances, such as sugar cane, tea, tobacco, millet, maize and rice.

d. Domestic Service:

Children do various domestic tasks, including; fetching water, collecting fuels and fodder, caring for younger siblings, working in the kitchen and cleaning. Other tasks include washing the dishes and doing the laundry. Domestic service, being invisible compared to other works makes children more vulnerable to abuse.

e. Shop Keeper/Service:

This includes the selling of sweets, working in teashops and in restaurants and bars.

f. Transportation:

Work such as conductors, ticket collectors on buses and tempos, as well as rickshaw drivers. Children from outskirts of urban areas are attracted to becoming conductors in tempos or micro buses.

g. Porters:

It includes street porters, tourist or trekking porters, and domestic porters. There are generally 2 types of porters, as identified by IPEC; long-distance porters who carry loads rurally, and short-distance porters who work mainly in urban areas such as in bus parks.

h. Construction Work:

Children work to build roads, houses, bridges, and sewerage systems.

i. Street Work:

This includes Street vendors of newspapers and other items, rag pickers, beggars, street singers, shoe shiners/makers. Street children are more prone to becoming drug addicts, to contracting HIV/AIDS, as well as to becoming exposed to a world of crime.

j. Commercial Sexual Exploitation:

This includes child prostitution, middlemen or contractors/pimps work in massage parlours, cabin restaurants and dance bars. Many children are trafficked from Nepal to India, to work in the commercial sex industry.

k. Bonded Labour:

However the Kamaiya system is abolished in July 2000, the bonded labour continues to influence many children's lives, different forms of bonded labour are still practiced in Nepal. There are also many debt-bonded labourers, who tend to work in places like carpet factories, households, restaurants, brick kilns, and so on.

l. Migrant Child Labour:

Often, children migrate from rural to urban centres such as Kathmandu, Biratnagar or Narayanghat with the aim of finding employment. Children sometimes migrate from India to work in Nepal.

m. Refugee Children:

Children of Tibetan refugees often work in carpet factories, frequently in Tibetan areas of the country or capital city, such as in Kathmandu's Bouddha and Lalitpur's Ekantakuna. Many Bhutanese refugee children try to find work in Eastern Nepal.

n. Circuses/Music Industry:

Many children work in circuses. A new phenomenon is the trafficking of children to work in circuses in India. Children also work in puppet or magic shows, or in commercial music programmes.

o. Publicity and advertising:

This includes child use such as in TV advertisements, radio programs, newspapers, and magazines.

Status of worst form of child labour in Nepal consolidated from different studies is shown in Annexes XVI and XVII.

Table 3- Percentage distributions of economically active children (10-14) by major occupation group, sex, Nepal 2001.

Occupation	Both Sexes	Male	Female
Prof. Technical Workers	--	--	--
Administrative Workers	--	--	--
Clerical Workers	0.2	0.3	0.1
Sales Workers	6.5	5.6	7.4
Service Workers	2.1	3.0	1.3
Farm and Fish Workers	61.5	60.0	62.9
Production Labour	0.2	0.2	0.1
Intermediate	28.8	30.2	27.6
Others	--	--	--
Non-stated	0.2	0.2	1.3

Source: CBS: Population Census 2001.

1.4.4.1 Some occupations and industries, and their associated hazards, where children are employed

Table 4 summarizes information on some of the hazardous agents to which working children may be exposed, according to the sources of exposure and the types of health consequences. It should be noted that these consequences may be aggravated when the exposed children are undernourished, anaemic or suffer

from chronic diseases. Finally, the lack of primary medical care, much less the services of health professionals with some sophistication in occupational health, means that these health consequences are not likely to be recognized promptly or treated effectively. (Sinclair and Trah 1991)

Table 4: Some occupations and industries, and their associated hazards

Occupation/industry	Hazards
Abattoirs and meat rendering	Injuries from cuts, burns, falls, heat, dangerous equipment; exposure to infectious disease; stress
Agriculture	Unsafe machinery; hazardous substances; accidents; chemical poisoning; arduous work; dangerous animals, insects and reptiles
Alcohol production and/or sale	Intoxication, addiction; environment may be prejudicial to morals; risk of violence
Carpet-weaving	Wool dust inhalation contaminated with fungal spores, poor lighting, poor posture (squatting); respiratory and musculoskeletal diseases; eye strain; chemical poisoning
Cement	Harmful chemicals, exposure to harmful dust; arduous work; respiratory and musculoskeletal disease
Glass manufacture	Molten glass; extreme heat; poor ventilation; cuts from broken glass; carrying hot glass; burns; respiratory disease; heat stress; toxic dust
Road Construction	Accidents; falling objects; musculoskeletal diseases; risk of injury to others Exposure to heat, burns; chemical poisoning; respiratory diseases

Occupation/industry	Hazards
Building Construction	Exposure to heat, cold, dust; falling objects; sharp objects; accidents; musculoskeletal diseases
Domestic service	Long hours; physical, emotional, sexual abuse; malnutrition; insufficient rest; isolation
Electricity	Dangerous work with high voltage; risk of falling; high level of responsibility for safety of others
Entertainment (night clubs, bars, casinos, circuses,)	Long, late hours; sexual abuse; exploitation; prejudicial to morals
Explosives (manufacture and handling)	Risk of explosion, fire, burns, mortal danger
Machinery in motion (operation, cleaning, repairs, etc.)	Danger from moving engine parts; accidents; cuts, burns, exposure to heat and noise; noise stress; eye and ear injuries
Mining, quarries, underground work	Exposure to dusts, gases, fumes, dirty conditions; respiratory and musculoskeletal diseases; accidents; falling objects; arduous work; heavy loads
Street trades	Exposure to drugs, violence, criminal activities; heavy loads; musculoskeletal diseases; venereal diseases; accidents
Welding and smelting of metals, metalworking	Exposure to extreme heat; flying sparks and hot metal objects; accidents; eye injuries; heat stress
Rubber	Heat, burns, chemical poisoning

1.4.5 Government's Response to Child Labour

The Constitution of Nepal (1990) seeks to protect the interest of children by conferring on them certain fundamental rights and imposing certain duties on the state in the form of the "directive principles and policies of the state". Article 20 of the Constitution guarantees the right against exploitation. It declares traffic in human beings, slavery, serfdom or forced labour in any form as prohibited and any contravention of the provision to be punishable under law. The Article also prohibits the employment of minors in any factory, mine or any other hazardous work. The Labour Act (1992) and the Children's Act (1992) enacted in pursuance of the constitutional mandate, make the employment of children below the age of 14 years an offence.

His Majesty's Government of Nepal is a signatory to the UN Convention on the rights of child (1989). It ratified ILO's Minimum Age Convention no.138 in October 1996. It is also a signatory to the Colombo resolution (1992) and the Rawalpindi Resolution (1996) of the South Asian Association for Regional Cooperation (SAARC) countries (1992), the latter calling for the elimination of hazardous child labour by 2000 and child labour in all its forms by 2010.

His Majesty's Government of Nepal signed a memorandum of understanding with the ILO for launching the International Programme on the Elimination of Child Labour (IPEC) in Nepal in February, 1995.

A National Steering Committee was formed by the Ministry of Labour in May 1995 in accordance with the memorandum of understanding. Similarly, the Ministry of Labour constituted a Central Labour Advisory Board under the chairmanship of Minister of Labour in 1997. The Board at its first meeting recommended to the Government to form a committee on fixing the minimum wage for the employees working in establishments, to form a tripartite committee at the local level, to establish harmonious industrial relations and to review existing labour legislation. The Ministry of Labour has since formed a minimum wage determination committee and a tripartite committee to review the Labour Act (1992).

However, the concerned authorities have neither effectively implemented the law nor formulated any effective plans of action for the welfare and rehabilitation of the victims of child labour exploitation. Whatever the programmes and plans of action for the elimination of child labour has been formulated during the period are full of confusion and ineffective

1.5 ABOUT THIS STUDY

In many jobs, workers are exposed to a combination of potential hazards. Both research and legislation usually consider factors in isolation and we currently have little knowledge of the impact of combinations of factors on health and performance efficiency. This research is addressing the issue of combined effects of occupational health hazards and aims to increase knowledge of the topic by reviewing the literature, conducting appropriate secondary analyses of existing databases and carrying out studies of the effects of combinations of potential stressors on physiological functioning, performance efficiency and subjective complaints on different health effects.

This study aims at finding the Occupational health and safety concept and its practice in 10 Small-Scale/Household Industries in the Kathmandu valley with more focus towards the child workers.

1.6 OBJECTIVES OF THE STUDY

The principal objective of this research was to obtain first hand information on Occupational health risks in Small-Scale/ Household Industries in Kathmandu valley. The study was focused on identification and evaluation of the occupational factors which may affect the workers' health, assessment of conditions of occupational health and factors in the organization of work which may give rise to risks for the health of workers and assessment of collective and personal protective equipment (PPE).

The broader objectives of the research have been highlighted as under:

- Identification of procedural guidelines to analyze occupational health risks in small scale and household industries in Nepal.
- To select 10 different small scale and house hold industries under operation within Kathmandu valley.
- To assess occupational health risks focusing more towards children in selected small scale and household industries in Kathmandu valley.
- To conduct quantitative and qualitative analysis of data and to prepare report.
- To disseminate the findings suggesting ways and means for minimizing major risks.

2.0 METHODOLOGY OF THE STUDY

The Consultants identified 10 different household/ small scale industries under operation within the Kathmandu valley. The selection of the industries were conceded after obtaining optimum resources from the HMG, Ministry of Industries, Department of Small and Household Industries and Industrial Area Management Offices at Balaju (Kathmandu), Patan and Bhaktapur.

As the study focused more towards child workers and the industries located in the industrial areas have not employed any child worker, some industries located outside the industrial area were selected to obtain ample information on child workers.

Those industries meeting criteria for small and household industries as defined by the Industrial Policy of Nepal were included in the study. The industries that have not given verbal consent to be included in the study were ignored. As the Child Labour (Prohibition & Regularisation) Act – 1999 defines “balak” (a child) to be of age less than 16 years and amends the definition of Ketaketi in the Labour Act, workers less than 16 years of age were considered as the child labours.

Secondary data from various sources were obtained on OHS. Different questionnaires were formulated for the study like Occupational Health Risk Assessment, socioeconomic questionnaire, questionnaire to obtain full occupational history and health related questionnaire.

Several methods were implemented to gather information for preparation of procedural guidelines to analyze occupational health risks in small scale and household industries in Nepal and to measure occupational health risks in ten selected small scale and household industries in Kathmandu valley with more focus towards children.

These include the following:

2.1 Review of Literature:

Reports of previous studies and other literature were reviewed to assess existing information on occupational health risks in small scale and household industries in Kathmandu valley with more focus towards children. This information was particularly useful for reviewing statistics on child labour, forms of child labour in Nepal, classification of industries, and occupational health hazards in different industries. Various Internet sites were also used to find information on child labour in Nepal. Similarly, extensive study of literatures on OHS was done to prepare procedural guidelines to analyze occupational health risks in small scale and household industries in Nepal. (Fundamentals of Industrial Hygiene, 1996; Harrington JM et al. 2000; ILO 1998) The literature and sites reviewed are listed in the reference section of this report.

2.2 Workplace Occupational Health Assessment

Workplace Occupational Health Assessment has been done in all ten industries visited following “Workplace Occupational Health Assessment Form” designed by the Institute of Occupational Health, University of Birmingham. (Annex XI) The form contained the information on general profile of the industry, types and sources of exposure, monitoring of workplace and control of the occupational hazards. In addition to that, walk-through survey was further strengthened using the Annex XII that contained more information on occupational hazards. Exposure assessment (monitoring / sampling) of the workers have not been done as it was not a part of the TOR.

2.3 Socioeconomic and Occupational History Survey

Structured questionnaires have been used to gather data on socioeconomic status and previous occupational history of the employees working in those industries. The questionnaire collected information such as education level, number of family members including children, total monthly income, alcohol and smoking habit, fuel type used, previous employments, accidents and diseases etc. (Annexes XIII and XV) All together 545 questionnaires each were filled out.

2.4 Health Check up

Health examination of around 135 children was done using a structured questionnaire to find out the health effects due to occupational hazards. (Annex XIV) The questionnaire used was modification of the questionnaire by Shukla and Trivedi (1998) which was used by them to determine the exposure assessment to environmental pollutants in Delhi. During health check ups, general vital indicators, skin, eyes, ENT organs, chest, abdomen and extremities were examined thoroughly.

Similarly, information was gathered on subjective complaints of the child workers associated with different psychological and physical effects induced by hard work

Confidentiality of all information about the respondents as well as names of the industries has been assured. Data thus acquired were entered into the statistical database and different rates have been calculated. The study has been done during a period of six months from 1st December 2004 till 31st May 2005.

3.0 RESULTS OF THE STUDY

3.0.1 Procedural Guidelines to analyze occupational health risks in small scale and household industries in Nepal.

The fundamentals of Occupational Health and Safety are to recognize, evaluate and control the hazards present at the work places. It is very essential to know the differences between hazard and risk. A hazard is something with the potential to cause harm, such as a substance, a piece of equipment, a form of energy, a way of working or a feature of the environment. Harm in terms of occupational health includes death and major injury and any form of physical or mental ill health. Risk is a measure of the likelihood that the hazard will manifest some degree of harm. Therefore, the highest risk is where something very hazardous is almost certainly going to result in severe harm.

The real reason for determining the risk is to decide what to do with the level of risk ascertained. Therefore, it is common for risk assessment and risk management to be integrated together. The later follows from information obtained from the former. The steps below include elements of risk assessment and risk management in small scale and household industries:

- Consider all activities and situations, both routine and non-routine, including foreseeable emergencies and loss of control.
- Identify the hazards, both intrinsic and those generated by all occupational activities.
- Identify which individuals or group of workers may be exposed to the hazards
- Determine and assess the risks to health from the hazards.
- Determine the degree of control of these risks, and whether this is adequate.
- Can these risks be eliminated or reduced?
- Implement new or improved risk control measures.
- Monitor the effectiveness of these controls and
- Review and implement any appropriate corrective actions if necessary.

The first four steps include the basic elements of occupational health risk assessment and are therefore, recommended to be included in the preparation of Procedural Guidelines to analyze occupational health risks in those industries.

Those steps consist of the various activities explained below in the chronological sequence.

1. Walk-through surveys

The first step and one of the most important acts in the analysis of occupational health risks is to actually venture into the workplace and see for oneself what people do and how they do it. In order to maximise the benefit of the visit, it is common to use a walk through check-list. Annexes XI and XII of the report contains a pro forma suggested for a walk-through survey. That contains many elements which are not always necessary and may even be difficult to complete. It is acknowledged that most workplaces contain a multitude of processes, all with their own hazards. So we can extract the relevant aspects of our needs from that pro forma, depending upon the types of industries.

2. Identification of Hazards

The primary function during the walk-through surveys remain the identification of hazards furnished by the reviewer's senses (sight, smell, sound, taste and touch). Much can be achieved without the need for the formal measurement of contaminants (many organic chemicals have distinctive smell; fine particles are made visible by shafts of light; ear can determine the frequency and intensity of industrial sound). In order to be systematic about reviewing all parts of a process, it is best to observe the process from beginning to end. For example, chemicals being looked should be reviewed at from raw materials through to the final product. Available of hazardous material data sheet of different chemicals is very supportive in that process. In depth knowledge about the work process and the chemicals involved in the industries being reviewed is mandatory.

3. Sampling (Exposure assessment)

If the walk –through surveys recognize various hazards at the workplace and a judgement is to be made about the risks to health in the working environment, measurement of the levels of different occupational hazards is necessary. Those occupational measurements are taken for comparison with Occupational Exposure Limits (OEL) or relevant standards. For that purpose, a well constructed sampling strategy should be made and should contain the basic elements, having answered the following simple questions.

- Why sample?
- What to measure?
- How to sample?
- Whose exposure should be measured?

- Where to collect the sample?
- When to measure?
- How long to sample for?
- How often to sample?
- What to do with the data?
- What to record?

Why sample?

It is very important to understand clearly what the purpose is for the collection of such data and what they are going to do with the results. Having determined the reason for sampling, it is necessary to determine the need or importance of the answer, thereby prioritising which contaminants / processes are associated with the highest degree of risk.

What to measure?

In the industrial settings, rarely only one substance is used and therefore a decision must be made as to which, of potentially many substances, should be measured. Usually this is not a problem for other contaminants such as noise, ionising radiation etc., where the sampling instruments are designed to be contaminant specific.

How to sample?

Depending on the question being addressed and the level of approach required, it is not always necessary to use the techniques with the greatest accuracy, precision, sensitivity and specificity. Not forsaking practical issues, such as the intrinsic safety, user acceptability (i.e. weight and size) and performance (i.e. flow rate range and battery longevity) of the equipment, the sampling and analytical methods chosen should meet the requirement of the sampling strategy.

Whose exposure should be measured?

In all sampling strategies, the decision of who to sample is vital. For that purpose, groups of workers with common exposure is to be formed either prospectively or retrospectively, and for a subset of these to be sampled randomly. Common exposure means that the group should be exposed to the same substances, and that each of the exposure distributions for the individual workers should have the same means and standard deviations.

Where to collect the sample?

There are two choices with regard to the location of the sampling device: to place the equipment on the individual (personal) or fix it to tripod, in which case it will be static over the duration of sampling (static or area). If an assessment of compliance or health risk is undertaken, the preferred location is personal, as this is more likely to reflect the individual's exposure.

When to measure?

It is very important to decide when to do sampling. We should be aware of the variability of exposure during work processes and to do sampling at such times, when the exposure level is high. If a random sampling program is used, care must be taken to ensure that sufficient samplings are obtained so that the rare tasks are likely to be included.

How long to sample for?

This is an area of great potential divergence between the requirements of compliance and epidemiology. Compliance testing requires the comparison of exposure with legislative airborne standards of which there are two time weighted average (TWA) reference periods – 8 hr and 15 min. Epidemiological evaluations poses greater problem because it is necessary to have some knowledge of the rate at which the contaminant causes a biological effect. Thus, if a substance has an acute effect (second to hours), the duration of sampling must be able to reflect this variability within a shift, whereas, if the effect is chronic, a more appropriate duration may be a weekly, monthly, annual, average or lifetime dose.

How often to sample?

The frequency of sampling depends upon the exposure variability – specifically the day-to-day variance. The greater the day-to-day variance, the greater the frequency of sampling. In addition, if certain events happen on an infrequent basis, and a random sampling schedule is being used, it is necessary to sample more often in order that at least one estimate will include this rare occurrence. Esoteric techniques are available to calculate accurately the frequency of sampling.

What to do with the data?

It is prudent to know what we are going to do with the data collected. A number of statistical packages are now available and can be used for interpretation and analysis of data.

What to record?

It is always necessary to record observations both at the time of sampling and in any subsequent reports. It is advisable to record more information than one would consider adequate.

4. Health Assessment

In occupational health practice, health assessments refer to the evaluation of the health status of an individual or group of workers. The reasons for assessment include the following:

- Obtaining baseline data on the state of health before occupational exposure to enable comparisons to be made in the future.
- Early detection of effects from occupational exposure (health surveillance). This allows removal from further exposure before chronic or permanent health results.
- Diagnosis of occupational disease.
- Determination of the extent of disability from non-occupational diseases, and assessment of compatibility with current job duties.

Health assessment uses some combination of symptom review, clinical examination, differential diagnosis and laboratory or physiological tests. It is normally a task for occupational health physician or nurses.

5. The occupational history

A full description of the individual's jobs and occupational exposures in the past should be obtained. It is a crucial part of any medical examination and, indeed, every occupational health worker should be taught to take a full occupational history. Some stated occupations like civil servants, maintenance man, retired need to be clarified, as these vague terms do not give much indication of occupational exposures.

Information about past occupations can be as useful as that about the present job. Previous occupations may be the cause of patient's current health problems, particularly for the diseases with long latent period like cancer, asbestosis.

The occupational history should contain information on the following items for each job:

- Job title
- Description of task / duties within the job title
- Employer and nature of the industry

- Duration of employment in each job
- Hours of work, including over time and shift work
- Exposure to occupational hazards
- Provision and use of PPE
- Sickness absence, especially for work related diseases or injury

6. Post sickness absence review

Review of the post sickness absence of the workers plays an important role. The reason for the review is to ensure that the person has no residual effects from the cause of the sickness absence.

7. Medical surveillance for group at risk

Medical assessments are required for the group of workers exposed to specific hazards in the workplace. The term “medical surveillance” has been used for the periodic medical/ physiological assessment of exposed workers, with a view to protect and prevent occupationally related diseases.

Some examples of the occupations that need periodical medical surveillance are:

- Lead workers: The medical assessment includes a review of exposure and symptoms which may indicate a lead effect – colic, constipation, lethargy and malaise, examination for the presence of anaemia, weakness of the extensor muscles of the wrists and Burton’s blue line in the gum margins.
- Workers exposed to mineral oils are regularly examined for any pathology in the scrotum
- Workers exposed to respiratory sensitizers: The periodic review of symptoms with lung function assessment is recommended for workers exposed to isocyanates, platinum salts, laboratory animal dander, glutaraldehyde and other recognised respiratory sensitizers. The symptom enquiry includes wheeze, breathlessness, chest tightness and nocturnal cough. The lung function tests include spirometry and peak flow determination.
- Food handlers: The medical surveillance of this group of workers is intended primarily to protect the products from contamination by infected material. Infections of relevance for this particular occupational group include enteric fever (typhoid and paratyphoid fever), salmonellosis,

verocytotoxin producing Escherichia Coli (VTEC) and Hepatitis A. For food handlers suffering from vomiting and diarrhoea, the occupational health staff should confirm that vomiting has ceased and bowel habits have returned to normal.

8. Biological monitoring and biological effect monitoring (BEM)

Biological monitoring refers to the analysis of biological samples for the presence of a chemical or its metabolite. The purpose of this procedure is to determine the extent of systemic absorption for a chemical encountered in the workplace. The merit of biological monitoring is that it takes into account all routes of absorption for any chemical. The biological samples analysed are usually blood and urine.

The term biological effect monitoring was proposed for periodic assessment procedures, where the effect to be detected is a change in some biochemical parameter or physiological measure, the significance of which may still need to be determined. Like biological monitoring, this is used as an indicator of exposure.

9. Review of medical records

Medical records may provide valuable information on various probable occupational related diseases. Records on individual workers that should be maintained at the workplace (by occupational health department) are the following:

- Pre-employment questionnaire: The main purpose of pre-employment assessment is to ensure that the person has no pre-existing ill health or disability which may make the performance of the proposed job difficult or unsafe for the individual, co-workers and the third party.
- Occupational history information, including data on previous and present jobs.
- Visits to the occupational health department / clinics or hospital and the reason and outcome of the visits.
- Results of physiological tests, e.g. lung function tests, audiometry or visual screening.
- Results of other laboratory investigations, e.g. antibody level for specific infections, biological monitoring and BEM results and blood and urine test results.
- Immunisation records including vaccination for specific protection against occupational infections.

- Communications and reports from family physicians or hospital doctors, nurses providing treatment to the workers.

The table below summarises the steps for assessment of occupational health risk in small scale / household industries in the chronological sequence.

Table 5: Summary of Procedural guidelines for assessment of occupational health risk in small scale / household industries

Assessment Tools	Variables
1. Walk-through surveys	Use readymade pro forma (guidelines) for survey
2. Identification of Hazards	Reviewer's senses (sight, smell, sound, taste, touch), review work process in detail, consult hazardous material data sheet
3. Sampling (Exposure assessment)	<ul style="list-style-type: none"> • Why sample? • What to measure? • How to sample? • Whose exposure should be measured? • Where to collect the sample? • When to measure? • How long to sample for? • How often to sample? • What to do with the data? • What to record?
4. Health Assessment	Symptoms review, clinical examination, differential diagnosis and laboratory or physiological tests
5. The Occupational History	<ul style="list-style-type: none"> • Job title • Description of task / duties within the job title • Employer and nature of the industry • Duration of employment in each job • Hours of work, including over time and shift work

	<ul style="list-style-type: none"> • Exposure to occupation hazards • Provision and use of PPE • Sickness absence, especially for work related diseases or injury
6. Post sickness absence review	Ensure that the person has no residual effects from the cause of the sickness absence
7. Medical surveillance for group at risk	Periodic medical/ physiological assessment of exposed workers, with a view to protect and prevent occupationally related diseases.
8. Biological monitoring and biological effect monitoring (BEM)	Analysis of biological samples for the presence of a chemical or its metabolite
9. Review of medical records	Pre-employment questionnaire, Occupational history information, Visits to the occupational health department / clinics or hospital and the reason and outcome of the visits, Results of physiological tests, Results of other laboratory investigations, Immunisation records including vaccination for specific protection against occupational infections, Communications and reports from family physicians or hospital doctors, nurses providing treatment to the workers.

3.1 Results on Socioeconomic and Occupational History Survey and Workplace Occupational Health Assessment:

Altogether 545 questionnaires on socioeconomic and occupational history were filled up. Similarly, Workplace Occupational Health Assessment was done in all ten industries under study. During survey, the majority of the respondents had shown unfamiliarity in relation between work and health effects. Out of total respondents, only 30% had shown knowledge on health effect of occupational factors. Whereas, only 20 % of the workers were found to be using various personal protective equipments (PPE) like mask, gloves, protective shoes, helmets, coveralls etc.

Results on Workplace Occupational Health Assessment, Socioeconomic and Occupational History Survey are presented for each industry separately under the heading of Case Studies in the Annexes section. Data from those industries were presented under the subheadings of Production Strategy, Working Environment Overview and Waste Produced, Socioeconomic Condition of the Workers, Occupational Health and Safety in the Industry, Possible Occupational Health Hazards and Safety Practices and Child Workers in the Industry. The results from each Case Study have also been compared with each other.

Table no. 6 shows the distribution of male and female workers along with the number of child workers within them and their working period in different industries under study. Similarly, Table 7 presents the information on various tasks the workers are involved in, occupational and environmental hazards present in the working environment and health outcomes / diseases the workers may develop as the consequences of exposure to those hazards in those industries.

Table 6. Scenario of distribution of workers in the industries under study and their working period

List of Industries	Number of adult workers		Number of child workers	Exposure period (in hours)
	Male	Female		
Metal Industry	28	2	10	8 – 12
Paint industry	25	0	0	8
Tent industry	32	28	0	8
Drinking water bottling Plant	36	12	0	8
Brick Kilns	45	33	35	10
Stone Crushing Plant	35	32	25	10
Construction Industry	42	5	15	8

List of Industries	Number of adult workers		Number of child workers	Exposure period (in hours)
	Male	Female		
Embroidery Industry	32	0	18	8 – 18
Instant Noodle Industry	40	32	0	8
Carpet Factories	30	56	32	10

Table 7. Occupational hazards and possible adverse health outcomes observed in the ten industries under study

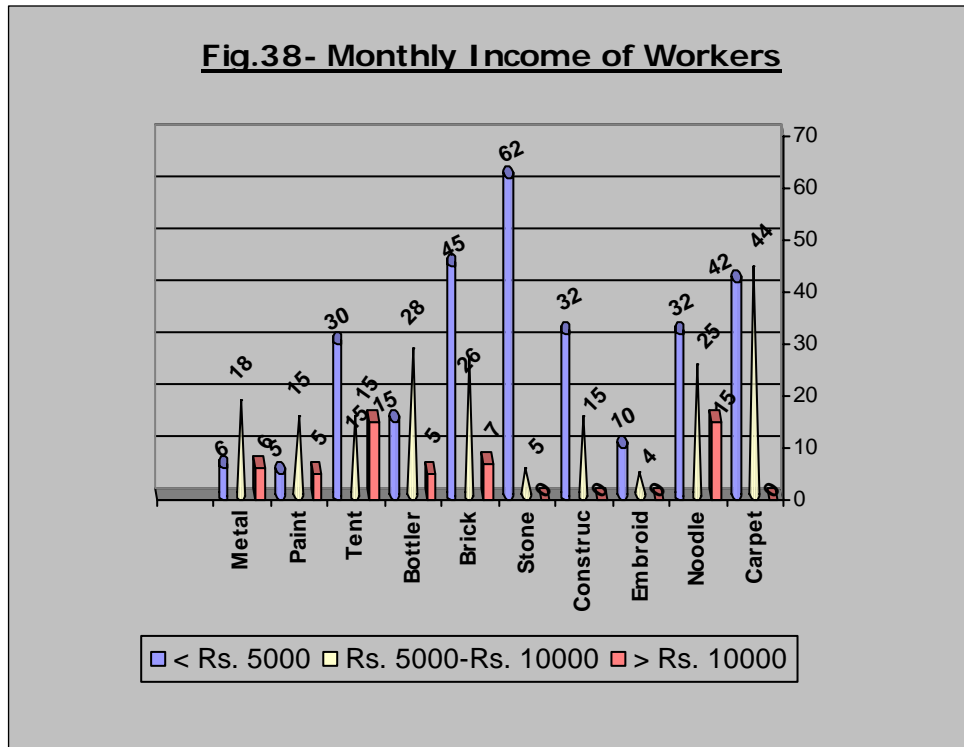
List of Industries	Tasks	Occupational Hazards	Health Outcomes / Diseases
Metal Industry	Casting, welding, brazing, forging, soldering, fabrication and surface treatment of metal	Inhalation of silica dust, exposure to high level of noise, extreme hot temperature, smoke and fume from burning of coal and furnace, tiny metal splinters etc.	ENT organs irritation, respiratory diseases, Ca lung, metal burn, hyperpyrexia, noise induced hearing loss, penetrating eye injury etc
Paint industry	Production of paints, varnishes, lacquers, enamels and shellacs, putties, wood fillers and sealers, paint and varnish removers, paint brush cleaners and allied paint products	Exposure to Mineral Turpentine Oil (MTO) that consists of compound of aliphatic hydrocarbons, aromatic hydrocarbons, esters, Ketones, glycol ethers and alcohols; heavy metals pigments such as cadmium, lead, zinc, chromium and cobalt; binders such as a variety of oils, resins, rubbers and polymers.	Contact dermatitis, pulmonary and renal diseases, lung cancer, irritation of the conjunctiva and upper respiratory tract etc.
Tent industry	Production of Tent, Tarpaulin and Sleeping	Sharp and piercing equipments like scissors, sewing needles, smoke	Occupational injuries, irritation of ENT organs,

	bags from natural and synthetic fibres, which comprised of manual cuttings, machine stitching, electric stitching and fabrication manoeuvring	from electrical stitching of synthetic materials. Inhalation of synthetic fibres and dust	respiratory diseases etc.
Drinking water bottling Plant	Bottling of drinking water after the processes of sand filtration, charcoal filtration, ozonation, reverse osmosis	Exposure to high noise level, poor working postures	Noise induced hearing loss, musculoskeletal disorders
Brick Kilns	Clay making, mixing and tempering, moulding of bricks and drying, brick transportation, workplace violence etc.	Inhalation of dust, exposure to harmful chemicals like hydrocarbons (HCs), sulphur dioxide (SO ₂), oxides of nitrogen (NO _x), fluoride compounds, carbon monoxide (CO), extreme cold and hot environments, heavy loads, etc.	Upper and lower Respiratory tract diseases, cold related diseases, swelling of limbs, dermatitis, musculoskeletal disorders, physical assault
Stone Crushing Plant	Manual handling of big stones, crushing and transportation etc.	Exposure to silica dust, high level of noise, inhalation of dust, poor ergonomics, frequents flying stones, lack of boundaries to crusher machines etc.	Respiratory and cold related deceases, swelling of limbs, musculoskeletal disorders, injuries to eyes, occupational accidents
Construction Industry	Digging, carrying heavy loads, mixing of cement with sand and gravel to form	Exposure to sand and cement dust, concrete mixtures, different chemicals used for quick setting and water proofing,	Acute and chronic respiratory tract diseases, dermatitis,

	concrete, making walls etc.	poor ergonomics, working at height, extreme climatic condition, pointed materials like nails and rods, high level of noise etc.	conjunctivitis, musculoskeletal disorders, fall from height, falling of construction materials over the workers, hearing loss etc,
Embroidery Industry	Imprint on the clothes (Saree, Shawl and Salwar Suit) using sitara, gold, metal wires and metal foils.	Constant ocular strain, poor ergonomics, inhalation of fine metal pieces and fibres, exposure to dust etc.	Musculoskeletal disorders, eye problems, stress etc.
Instant Noodle Industry	Production of instant noodles (preparation of dough, cutting, steaming, flavouring, frying and packaging of noodles)	High level of noise, moving parts of machineries, slippery flooring tiles due to oil stains, high temperature etc.	Noise induced hearing loss, accidents and injuries, burn and scalds etc.
Carpet Factory	Wool spinning and thread rolling, wool dyeing, carpet weaving, washing, etc.	Inhalation of wool dust contaminated with fungal spores, poor (squatting) work posture, exposure to hazardous chemicals, workplace violence, sexual harassment etc.	Respiratory diseases, musculoskeletal diseases (eye strain and defective vision at premature age), chemical intoxication, aggravation of non-occupational diseases etc.

3.2 Comparison of Baseline Characteristics of Workers from all Industries

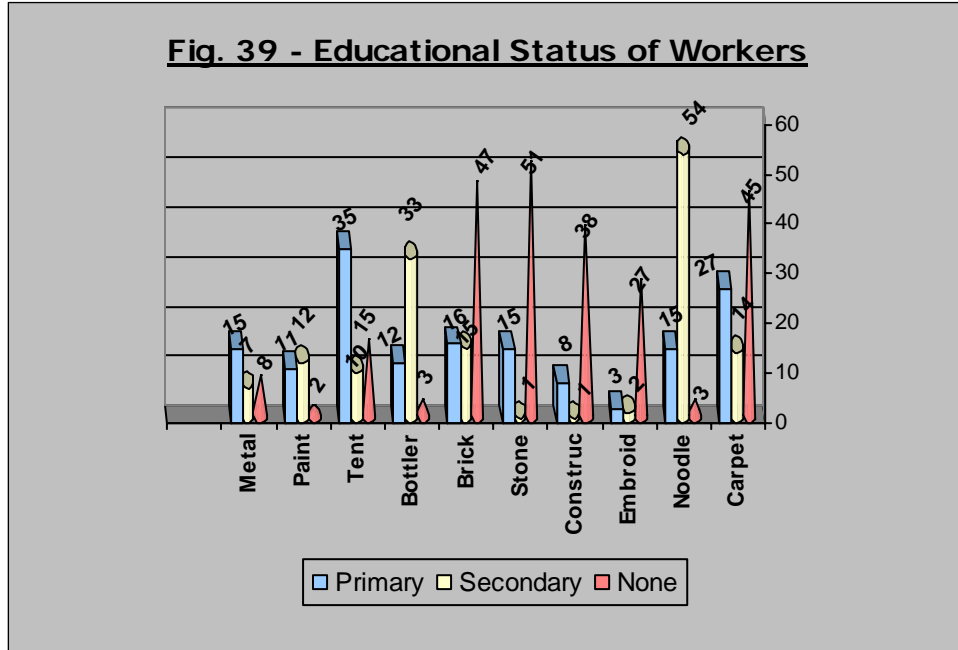
Important baseline characteristics such as gender, education level, monthly income, alcohol drinking habit of the workers in all ten industries have been compared.



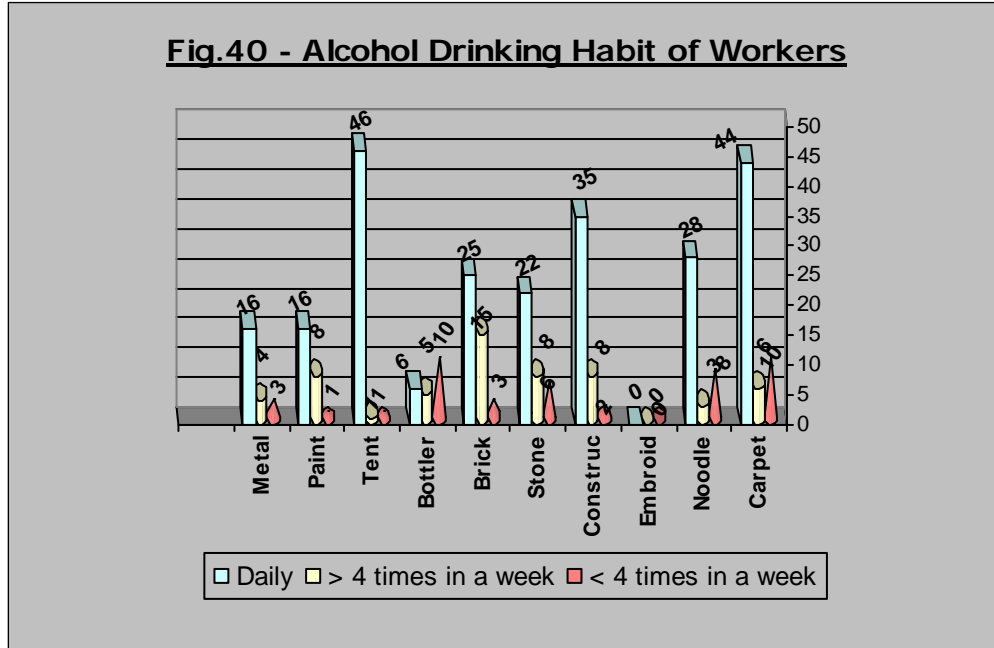
Out of total 545 workers present in the industries under study, altogether 135 (24.8%) were child workers, which is a considerably higher percentage. And, significantly higher proportion of child workers (97%) was illiterate compared to 3% of children with primary level education. Among 135 child workers, 23 (17%) were girls.

Monthly income of the workers was less than five thousand rupees in the majority of the industries under study, except in the metal, paint, bottler and carpet industries. Monthly salary of the majority of the workers in those occupations ranged in between five to ten thousand rupees. In the industries such as stone crushing, construction, embroidery and carpet, none of the workers were earning more than ten thousand rupees per month. (Figure 38)

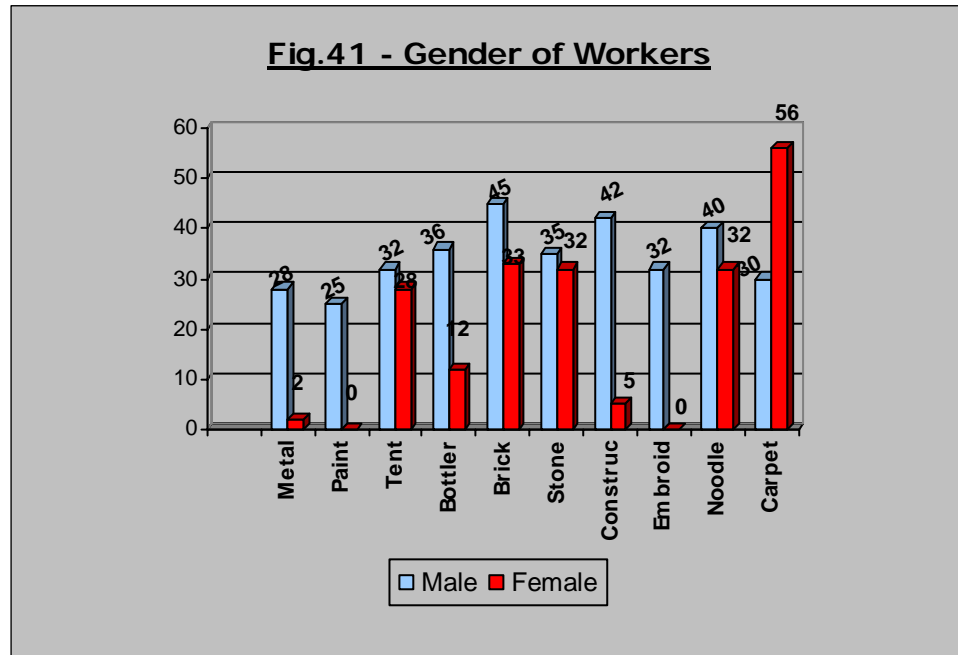
Figure 39 shows that majority of the workers in brick kiln, stone crushing, construction, embroidery and carpet industries were illiterate compared to higher number of workers with secondary level education in the drinking water bottling and instant noodle industries.



It is evident from figure 40, that the alcohol drinking habit was habitual among significantly high number of workers. Majority of the workers were daily drinkers followed by more than four times in a week.



Number of the female workers was significantly lower compared to male workers. In few industries like paint and embroidery, female workers were lacking.



3.3 Results on Health Check Up

3.3.1 Identified health outcomes / diseases from medical examinations

A thorough medical examination of around 135 child workers was done using a structured questionnaire to find out the health effects due to occupational hazards. During health check ups, general vital indicators, skin, eyes, ENT organs, chest, abdomen and extremities were examined thoroughly.

Data gathered from the questionnaires and medical examination were scrutinized and classified into the following major health outcomes / diseases:

- Eye problems like conjunctivitis, dry conjunctiva, Bitot's spot
- Ear problems like wax in ears, otitis externa
- Nose problems like polyp and nasal discharges
- Upper Respiratory Infection (URI) included all respiratory infections that affect ENT organs like sinusitis, otitis media, influenza, rhinitis, pharyngitis, tonsillitis
- Lower Respiratory Infection (LRI) included infections of trachea, bronchi and lungs
- Skin problems like dermatitis, eczema, cut injuries

- Abdominal problems included distension of abdomen, diarrhoeal diseases, hernias, varicocele
- Musculoskeletal problems like bony deformities, calluses, swelling of joints pain in spine
- Other problems: Diseases like scabies, pin worm infestation, anaemia etc.

Similarly, information was gathered on subjective complaints of the child workers what they think were the consequences of their hard work and were classified as the following:

- Headache
- General body ache
- Fatigue
- Irritation
- Weakness
- Sleep disturbances
- Depression

The data on different health outcomes/ diseases and subjective complaints were processed and categorised to compute the following statistics:

- The overall health outcomes/ diseases Prevalence Rates
- Prevalence Rates categorised by different types of industries
- The overall subjective complaints Prevalence Rates

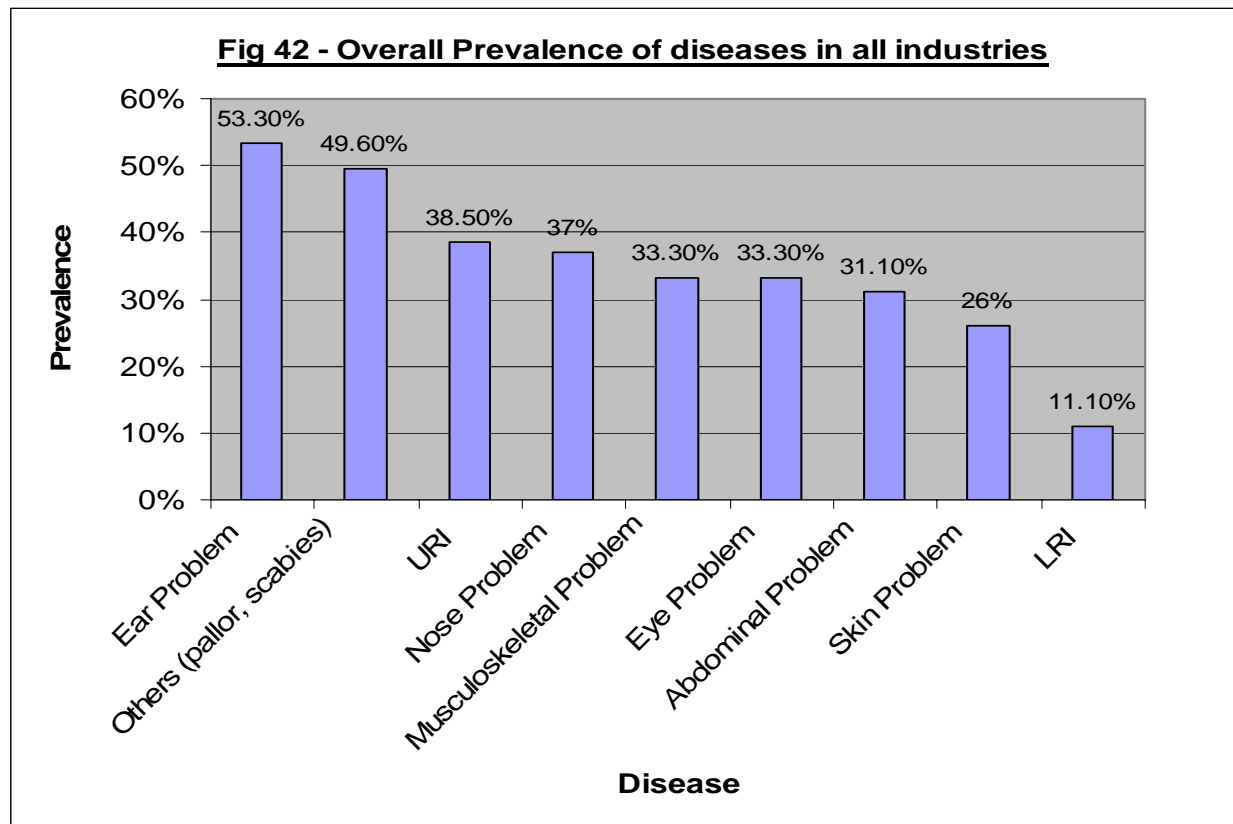
3.3.2 Prevalence of overall health outcomes / diseases

3.3.2.1 Overall prevalence

The table no. 8 and figure no. 42 show the prevalence of different health outcomes / diseases among the child workers (135). Except for lower respiratory tract infection (LRI), the prevalence of all diseases is found to be significant. The highest prevalence is found to be 53.3 % for ear problem where as 49.6% and 38.5% were suffering from others (e.g. scabies, anaemia, pin worm infestation) and URI respectively. Also 37% of the respondents had nose problems.

Table 8: Overall Frequency Distribution of Health Outcomes / Diseases

S. N.	Disease	Yes		No		Total
		Frequency	%	Frequency	%	
1	Eye Problem	45	33.3	90	66.7	135
2	Ear Problem	72	53.3	63	46.7	135
3	Nose Problem	50	37	85	63	135
4	URI	52	38.5	83	61.5	135
5	LRI	15	11.1	120	88.9	135
6	Skin Problem	35	26	100	74	135
7	Abdominal Problem	42	31.1	93	68.9	135
8	Musculoskeletal Problem	45	33.3	90	66.7	135
9	Other problems (pallor, scabies, pin worm etc.)	67	49.6	68	50.4	135



3.3.2.2 Prevalence Rates categorised by different types of industries

The table no. 9 shows the prevalence of different health outcomes / diseases among the respondents from different types of industries. Similarly, table no. 10 shows different industries with the highest number of workers within them suffering from different health problems

The prevalence of eye problem was very high among the child workers from stone crushing (48%) and brick kiln (45.7%) industries. Availability of excessive amount of dust in those industries might support the evidence. Surprisingly, there was no case of eye problem in the construction industry. Suffering from ear problems was very significant in almost all types of industries, being highest in the construction industry (66%). Lack of personal hygiene might be a cause for wax in the ear and otitis externa.

The prevalence of skin problems like eczema, dermatitis was highest among the child workers in the metal industry (70%) followed by brick kiln industry (51.4%), which could be explained by extensive contact with irritant chemical substances and brick dust respectively in those industries. There are no skin problems in the embroidery and carpet industries.

The prevalence of LRTI is relatively low compared to other diseases, stone crushing industry being at the top (24%).

Similarly, URTI, abdominal problem and musculoskeletal problem were highest among the children working in stone crushing (60%), embroidery (83%) and carpet (50%) industries respectively.

The prevalence of pallor was also very high among the children working in the embroidery industry (67%). That evidence was highly suggestive of intestinal worm infestation, which could also be the main reason for the abdominal problem as well. Out of 32 child workers from the studied carpet industry, 25 children were suffering from scabies, which would reflect their very poor personal hygiene and environmental sanitation.

Table 9: Cumulative Frequency Distribution of Health Outcomes / Diseases in different industries

S.N.	Diseases	Frequency (%) in different industries						
		Metal (10)	Brick Kiln (35)	Stone Crusher (25)	Constru- ction (15)	Embroidery (18)	Carpet (32)	Total (135)
1	Eye Problem	3 (30%)	16 (45.7%)	12 (48%)	0	7 (39%)	7 (22%)	45
2	Ear Problem	5 (50%)	20 (57.1%)	10 (40%)	10 (66%)	9 (50%)	18 (56%)	72
3	Nose Problem	5 (50%)	22 (62.8%)	12 (48%)	7 (58%)	0	4 (12.5%)	50
4	URI	2 (20%)	17 (48.6%)	15 (60%)	3 (20%)	0	15 (47%)	52
5	LRI	0	4 (11.4%)	6 (24%)	0	0	5 (16%)	15
6	Skin Problem	7 (70%)	18 (51.4%)	6 (24%)	4 (26%)	0	0	35
7	Abdominal Problem	1 (10%)	7 (20%)	9 (36%)	0	15 (83%)	10 (31%)	42
8	Musculoskeletal Problem	2 (20%)	10 (28.6%)	12 (48%)	5 (33%)	0	16 (50%)	45
9	Other problems * (pallor, scabies)	1P (10%)	10 P (28.6%)	12 P (48%)	0	12 P (67%)	7 P 25 S =32 (100%)	67

* P: Pallor (anaemia) S: Scabies

Table 10: Different Industries with the highest number of workers suffering from different health problems

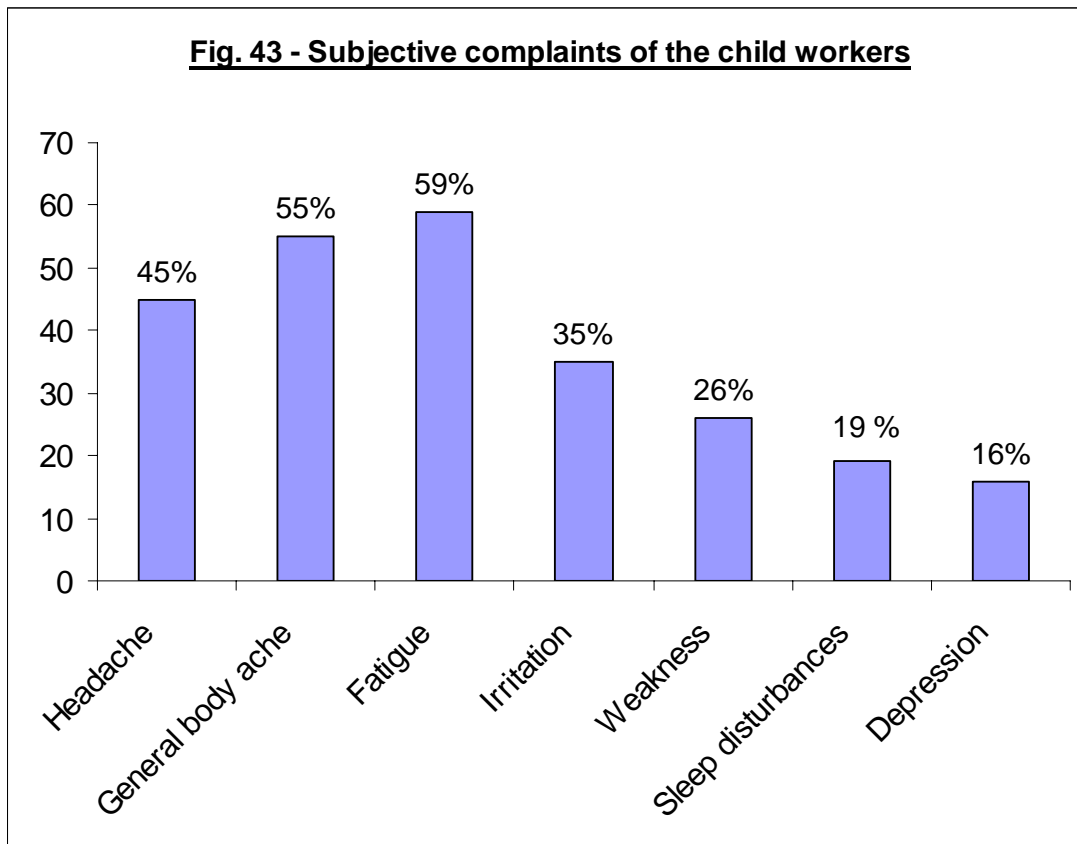
Diseases	Different industries with highest number of disease (% of workers suffering from problems)		
	1st Position	2nd Position	3rd Position
Eye Problem	48% Stone Crusher	45.7% Brick Kiln	39% Embroidery
Ear Problem	66% Construction	57.1% Brick Kiln	56 Carpet
Nose Problem	62.8% Brick Kiln	58% Construction	50% Metal
URI	60% Stone crusher	48.6% Brick Kiln	47% Carpet
LRI	24% Stone Crusher	16% Carpet	11.4% Brick Kiln
Skin Problem	70% Metal	51.4% Brick Kiln	26% Construction
Abdominal Problem	83% Embroidery	36% Stone Crusher	31% Carpet
Musculoskeletal Problem	50% Carpet	48% Stone Crusher	33% Construction
Others (pallor, scabies)*	7 P 25 S =32 (100%) Carpet	12 P (67%) Embroidery	12 P (48%) Stone Crusher

* P: Pallor (anaemia) S: Scabies

3.3.2.3 Prevalence Rates of overall subjective complaints

Weighted complaints of the respondents contemplated to different psychological and physical effects induced by the hard work are shown in the figure no. 43.

The major health effects induced by the hard physical work was observed as fatigue, general body ache, headache, irritation, weakness, sleep disturbance and depression.



4.0 Conclusion and Recommendation

4.1 Conclusion

4.1.1 Occupational Health Status

The occupational health and safety practices in small scale/house hold industries in Kathmandu is found to be insignificant, out of the ten industries only few industries have been practicing some occupational health and safety practices, the over all scenario is quite vulnerable (see annexes I – X for detail). Health status of the child workers is also unsatisfactory. Majority of them are suffering from some work related health problems.

The occupational health and safety service in Nepal is still in the developmental stage. Here, the occupational health & safety refers mainly to the workers of industries but does not completely cover all occupations of the country.

In Nepal, as in most countries in the west the responsibility for health and safety at work is placed on the employer, although the government has some kind of occupational health care services and safety standards. Occupational health services are provided as benefits to the employees and generally are separate from other community health services. It is of concern that in Nepal, like other developing countries pre-existing malnutrition and a high incidence of infectious disease, however, frequently compound the problems of exposure to occupational hazards.

It is found that the major considerations in industries are higher production and greater economic returns. The main economics centred on the employer's benefit. Few importances are focused on the social costs in terms of impacts on workers, society, and the environment. The impacts are compounded by inappropriate value of life considerations, pain and suffering, opportunity costs and questions of equity. The estimates of direct economic costs and benefits are usually made keeping aside the ethical liabilities to the society as a whole. Entrepreneurs often consider the regulatory compliances and related administrative cost as developing countries, many of which are undergoing rapid industrialization; the importance of occupational health is increasingly realized.

Lack of work environment standards and exposure limits for different hazards and lack of requirement for periodic structured objective driven medical examination are the major deficiency of the legislations in terms of occupational health and safety.

The overall activities on OHS are limited, few institutions conducts awareness, training and research activities regarding OHS issues. Training and education facilities on OHS are inadequate and limited mainly in governmental undertakings.

National Statistics concerning OHS is inadequate and gather information mainly from secondary sources and there is no proper primary data collection system in place. So, the problem of under reporting and miss reporting cannot be ruled out. The occupational accident and injury statistics are difficult to obtain.

This study was conducted to assess the state of OHS through surveys on employee, employer and working environment in the small scale/household industries in Kathmandu with more focus on child workers. The study revealed that the state of OHS is quite bad particularly regarding workplace environment and OHS awareness. The productivity is relatively high compared to workplace environment and OHS awareness. The productivity is comparatively high because they employ many women and child labours in temporary basis. It was also found that due to inadequate OHS practice, many industries are prone to accidents and casualties and many of the accidents occurred due to gross negligence and awareness regarding fair OHS practice. There are some examples of good OHS practices in some industries, enjoying the benefits through not only with increased production but also with safe working environment.

4.1.2 Child Labour Status

In many establishments employing child labour, working conditions range from bad to terrible. Since many of these enterprises are poor and marginal to start with, and are often operating illegally, little or no attention is paid to amenities that would be required. Lack of elementary sanitation, air quality, potable water and food are often compounded by crowding, harsh discipline, old-fashioned equipment, poor quality tools and the absence of protective measures to control exposure to occupational hazards. Even where some protective equipment was available, it was rarely sized to fit the smaller frames of children and is often poorly maintained.

Too many children worked for long hours. Dawn to dusk is not an unusual working day, and the need for rest periods and holidays is generally ignored. As a result, their health status was very poor and majority of them were suffering from different ailments.

Girls are particularly at risk. Because they are often also responsible for household tasks, they work longer hours than boys, who usually engage only in economic activities. As a result, they generally have lower rates of school attendance and completion. They are also at risk of sexual harassment.

In general, the risks that children face in the workplace are the same that adult workers encounter. However, their effects may be greater because of the kinds of tasks to which children are assigned and the biological differences between children and adults.

Children tend to be given more menial tasks, often without instruction and training in minimizing exposure to the hazards that may be encountered, and without proper supervision. They may be assigned to cleaning-up duties, often using solvents or strong alkalis, or they may be required to clean up hazardous wastes that have accumulated in the workplace without awareness of potential toxicity.

Because of their smaller size, children are more likely to be given tasks that require working in odd, confined places or long periods of stooping or kneeling. Often, they are required to handle objects that even adults would consider too bulky or too heavy.

Because of their continuing growth and development, children differ biologically from adults. These differences have not been quantified, but it is reasonable to assume that the more rapid cell division involved in the growth process may make them more vulnerable to many toxic agents. Exposure earlier in life to toxic agents with long latency periods may result in the onset of disabling chronic occupational diseases such as asbestosis and cancer in young adulthood rather than at older ages, and there is evidence that childhood exposure to toxic chemicals may alter the response to future toxic exposures

Children are emotionally immature and need a nurturing psychological and social environment that will socialize them into their cultural environment and enable them to take their places as adults in their particular society. For many labouring children, the work environment is oppressive; in essence, they do not have a childhood.

4.2 Recommendation

Developing occupational health and safety management and practice is a must for developing nation like Nepal, rapid population growth with increasing urbanization and industrialization must be counter balanced with proper strategic vision of developing occupational health and safety practices. The following developing tools are recommended for wide spread of OHS in Nepal:

- Strengthening and implementing National policies for health and safety at work and development of policy tools.
- Regular monitoring on compliance of existing occupational health and safety related acts and regulations.
- Development of healthy work environment:

Without prejudicing the primary responsibility of the employer for ensuring safety at work, government policy, legal actions and enforcement are needed to ensure minimum levels of health and safety in all sectors of the

economy, including small-scale enterprises, the informal sector, agriculture and the self-employed. Occupational health programme should be considered as integral components of socio-economic development.

- Development of healthy work practices and promotion of health at work:

Many occupational hazards can be avoided and controlled through the adoption of appropriate working practices by the worker. This is possible by providing him or her with information, tools, work organization and work aids that enable a safe and decent workplace. This requires knowledge of health hazards at work and how to avoid them. In some instances personal protective devices may be needed.

Workers lifestyles may have specific or general impact on their occupational health and safety and working capacity. Health education on avoiding the combined effects of lifestyle factors and occupational exposures should be effectively provided.

- Strengthening of Occupational Health Services:

The emerging problems of occupational health call for the development of OHS for all workers in all sectors of the economy and in all enterprises, as well as for the self-employed.

- i. Modern occupational health services should draw from relevant professions, e.g. occupational medicine and nursing, occupational hygiene, work physiology and physiotherapy, ergonomics, safety and work psychology.
 - ii. The preventive approach should be given the highest priority.
 - iii. Due consideration should be given to the needs of Occupational Health Services for the self-employed, agricultural workers, persons employed in small-scale enterprises, migrant workers and those in the informal sector. Sometimes such services can be provided by primary health care units specially trained in occupational health.
- Establishment of support services for occupational health:

Many countries have organized such services in institutes of occupational health but many others rely on services provided by universities, large industries or individual consultancies.

- i. Governments and authorities responsible for occupational health should ensure the availability of expert services for Occupational Health Services by guaranteeing the availability of institutions with the necessary capacity and manpower.

- ii. The potential shortage of such experts should be considered in the planning of the training curricular and programme for occupational health.
- iii. A national quality assurance and quality management element should be included in occupational health programme and appropriate training should be provided to responsible personnel.
- o Development of occupational health standards based on scientific risk assessment:

To ensure minimum levels of health and safety at work are applied, standards which define the safe levels of various exposures and other conditions of work are needed. The standards also serve as references for assessment of the result of monitoring and provide guidelines for planners. In the further development of standards the high variation in workers' sensitivity to occupational exposures should be considered. A relevant scientific basis for setting standards should be ensured through collaboration with research organizations.
- o Development of human resources for occupational health
- o Establishment of information systems
- o Strengthening of research
- o Development of collaboration in occupational health and with other activities

Although much is being done to eliminate child labour, it is clearly not enough. What is needed first is more and better information about the extent, dynamics and effects of child labour. The next step is to increase, amplify and improve educational and training opportunities for children from pre-school through universities and technical institutes, and then to provide the means for children of the poor to take advantage of them (e.g., adequate housing, nutrition and preventive health care).

Well-drafted legislation and regulations, reinforced by such international efforts as the ILO Conventions, need constantly to be revised and strengthened in the light of current developments in child labour, while the effectiveness of their enforcement should be enhanced.

The following measures are recommended for the reduction of child labour in Nepal:

Research and Study

Comprehensive research and studies need to be carried out in specific sectors that are not covered by the existing studies. For example, there is little information on child prostitution, girl trafficking, child-bonded labour, children in armed conflicts, children in drug peddling, etc.

Policy and Institutional Development

Child labour has been briefly touched in the Labour Policy of the government. A clearer policy of the government and its follow up mechanism with regard to child labour must be in place for effective government initiatives. Strong co-ordination among various central and local governments must be developed. For this, capacity of respective agencies should be enhanced. Codes of conduct play a vital role in changing attitude of the people towards child labour. In India, a code of conduct for civil servants has helped to reduce the domestic child labour, dramatically.

Legislation and Enforcement

Without serious attempts to implement and enforce the existing laws on child labour and related issues, it is difficult to point out the exact amendments required. So, effective implementation and enforcement should take priority over new legislation and amendments. Clear division of responsibility, culture of accountability, end to impunity, hassle free and efficient justice systems are fundamental pre-requisite for effective legal enforcement.

Advocacy, Networking and Social Mobilisation

Awareness, advocacy and sensitisation should go hand-in-hand with other interventions.

The ultimate weapon may be the development of greater awareness and revulsion of child labour among the general public, which we are beginning to see in several industrialized countries. The resultant publicity is leading to damage to the image of organizations marketing products produced by child labour, protests by their stockholders and, most important, refusal to purchase these products even though they may cost a bit less.

Education and Health

There are two ways that education and health initiatives help in child labour elimination efforts. The first is, improvement of these services in general, will prevent child labour. The second is, education and health components must be

included in an effective rehabilitation initiative. Accessible and quality education could be the single most important factor for effective control of child labour in rural areas.

Income and Employment Generation

Intervention is to be designed and implemented for families of existing and prospective child labourers. Initiatives for income and employment generations have preventive as well as rehabilitative roles. Unless the supply side of the child labour issue is properly addressed, children from rural areas will continue to join workforce in urban centres. And unless, working children see that they will have opportunities for education while their families have better income or employment opportunities, child labourers cannot effectively be removed from work.

Poverty and child labour always operate in vicious cycle. Poor parents cannot send their children to school or quality education is out of their reach. For child labourers with lost childhood, their future is doomed.

Protection

Similarly, initiatives like workplace monitoring, work condition regulation and improvement, legal counselling and support, rescue, etc. are essential for protection of working children.

Rehabilitation

For rescued child labourers, there must be meaningful rehabilitation programmes with appropriate education and training, health care and counselling with eventual goal of social re-integration.

Finally, while it is entirely appropriate and healthy for children to work as part of normal development and family life, child labour as described in this article is a scourge that not only damages the health and well-being of the child workers but, in the long run, also impairs the social and economic security of communities and nations. It must be attacked with vigour and persistence until it is eradicated.

There are many small-scale and household industries operating in Nepal, which are not yet registered. They often use old machinery, unsafe buildings and workers with limited occupational hazard knowledge. Personal protective equipment is seldom available and they solely depend on the child workers. Such work setting is one of the main sources of exposure to different occupational hazards. It is very difficult to achieve information about details concerning hazardous chemicals including carcinogens in the industries in Nepal, but there seems to be a large number of workers who are exposed to different hazards in a large number of industries. The government bodies do not have full information about the types of occupational hazards present in the industries in Nepal. It

would be highly recommended to keep detailed information about the occupational hazards in the work settings. Child workers should not be allowed to work under extremely hazardous conditions.

Results of this study strongly indicate that there are many occupations and industries in Nepal where a huge number of child workers are employed with possible exposure to hazards. This could have been the reason for high prevalence of different health related problems among the child workers, though the actual relationship could not be associated as the level of exposure was not measured. In this study, only ten small-scale / household industries that are located within the Kathmandu Valley were included which might not actually represent the real scenario of such industries in our country. The study demonstrates the need for further research on occupational health in Nepal with inclusion of more number of industries and sampling for different occupational hazards so that an association between exposure and the health effects could be made. As this study is one of the first studies on occupational health with more focus towards children in Nepal, it will provide baseline for the future researches on occupational health.

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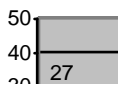
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ANNEX I

CASE STUDY: A METAL INDUSTRY

A metal industry located in Kathmandu was selected for the study; the industry produced finished metal items like cooking utensils and souvenir items of Aluminium, Brass and Bronze. The industry had 30 workers; however with 10 child workers.

Production Strategy

Metal Aluminium was collected from different sources, majority of Aluminium was imported and a few were recycled in the industry itself. The alloys, Brass and Bronze were also imported and a few were manufactured in the industry. Thus



Photo 1: Metal casting by a worker

obtained metal and alloy then underwent different metallurgy process as smelting and refining of metal ores and scrap, casting molten metals into a given shape (foundry), welding and cutting sheet metal, shaping metals on different machines. A wide variety of techniques were used to finish metals, including grinding and polishing, abrasive blasting and many surface finishing and coating techniques as anodizing, powder coating and arc welding method were used.

Working Environment Overview and Waste Produced



Photo 2: Metal Processing in furnace environment, it lay remain dispersed in the industry resulting cloud of smoke which hampered the work of the workers.

The industry principal waste included metal scraps and metal dust of Aluminium, Brass and Bronze. The Aluminium scrap and dust had a resale value and was sold. However, scrap and dust of Bronze and Brass was disposed off as a solid waste. The factory lacked proper heating chambers and a chimney, the smoke and fumes of metal and smoke produced from coal used for burning did not had a proper channel to escape to the ambient

Constant grinding and polishing of metal produced particulate matters of the metal. The industry uses Buffing machines and grinding machines powered by 6 motors of 4 horse powers each producing horrendous noise.

The industry lacked proper sanitation and hygiene practices and management.



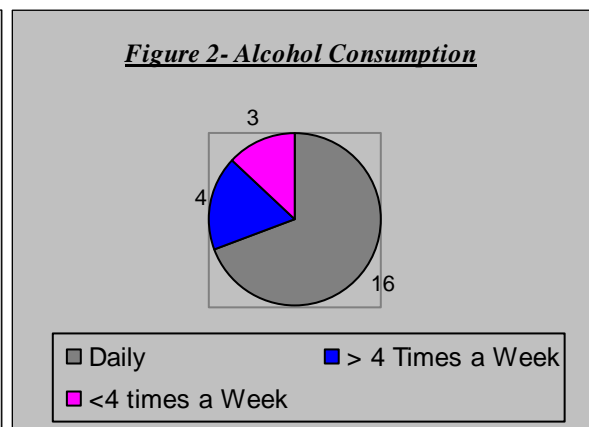
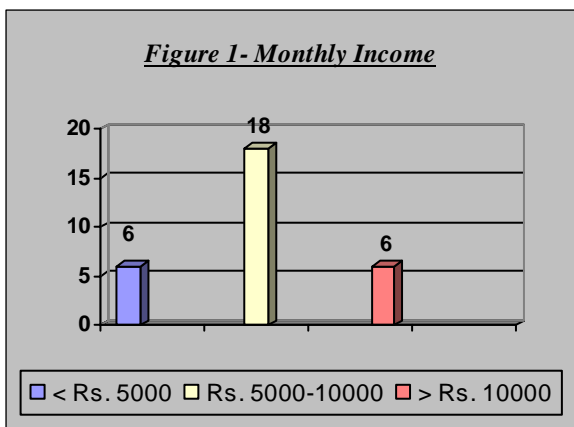
The infrastructure of the industry was also considered to be inadequate; the workers complained dripping of water from the ceiling during the monsoon season hampering their work. The waste disposal system implemented by the industry was even more precarious, the waste was simply disposed as municipal waste, and an effective disposal management has not been practiced.

Photo 3: Grinding and Polishing of Metal

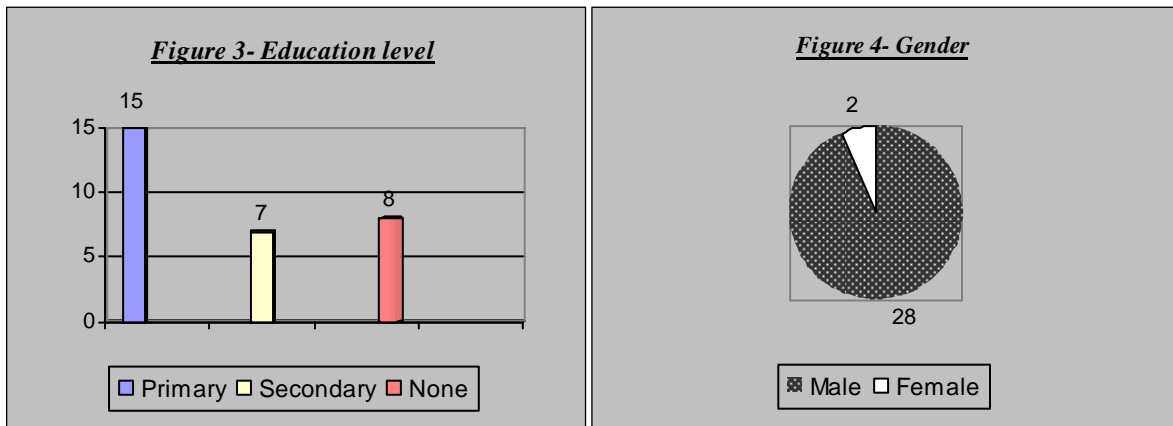
Socioeconomic Condition of the Workers

Migrant workers dominated the industry, 16 workers were migrant workers from different parts of Nepal and India. The male workers were dominant over the female workers. Only 2 female workers were found in the industry. Ten children were found to be working in the industry, it was found that 9 children accompanied their parents to work and finally started working themselves where as 1 child was working with his willingness.

The workers lacked education and none of the workers encountered had completed their basic schooling the average workers had just completed their



4 years in school. 6 workers were found to be consuming alcohol every day, 7 workers were under the habit of smoking ranging from 2 cigarettes per day to 20



cigarettes per day. Housing facility and medical benefits to the worker have been provided by the industry. The income of the workers ranged from Rs.4, 500 to Rs.15, 000 per month working for more than 8 hours per day.

Occupational Health and Safety in the Industry

Although all the respondent workers knew more or less on occupational health and few health disorders related with their occupation, *only 1 worker have been found to practice occupational health and safety.* The worker complained that using masks and other equipment for safety hampered their work and it was tedious as well to use them.

Molasses Replaces Masks!!


Mohamed Nafis Ansari, 35, a migrant worker from Moradabad, India says, 'I have been working in furnace from the past 15 years melting metals but haven't used masks and other equipment, back in India we simply have a practice of taking a lump of molasses, it clears up all the soot, smoke and dirt that we take in during work' His unique practice has been shared by other workers in the industry and molasses has replaced masks.

The industry has not provided any personal protective equipment (PPE) but has asked their workers to cover their nose and mouth, the management claims that though the mask is provided to the workers they are reluctant in using it.


The workers are aware of the occupational health and safety but are unaware of the consequences caused by not practicing them. Lack of awareness could be the main culprit behind not using the safety practices. The combined environmental and health scenario of the industry makes it vulnerable to the occupational hazards.

Possible Occupational Health Hazards and Safety Practices

Metalworking involves casting, welding, brazing, forging, soldering, and fabrication and surface treatment of metal. Applying an investment containing a form of silica, creating the risk of silicosis, commonly makes the mould. Moulds are made using sand and oil, formaldehyde resins and other resins as binders. Many of these resins are toxic by skin contact and inhalation, requiring skin protection and ventilation.



Result of unsafe working habit



Mohamed Naeem, 32, a migrant worker from Moradabad, India had severe burn when he was working in furnace, the molten metal exploded suddenly burning his left foot and some part of face near his left eye. He says that accidents do happen in this type of job. He completely blames fate for this accident and ignores the reality of using safety devices as face covered helmet, gloves and protective shoes.

A canopy hood exhausted to the outside is needed to remove carbon monoxide and metal fumes for proper fume and smoke exhaustion, which lacked in this industry.

Breaking away the mould can result in exposure to silica. Local exhaust ventilation or respiratory protection is needed. The metal filings can irritate the skin and eyes. Forging can create great amounts of noise, which can cause hearing impairment. Small metal splinters may damage the skin or eyes if precautions are not taken. Burns are also a hazard with hot forging. Precautions include good tools, eye protection, routine clean-up, proper work clothing, isolation of the forging area and wearing ear plugs or ear muffs which were absent in the industry.

Cleaning, grinding, filing, sandblasting and polishing are some final treatments for metal. Cleaning involves the use of acids in process of pickling. This involves the hazards of handling acids and of the gases produced during the pickling process. Grinding can result in the production of fine metal dusts that can be inhaled and heavy flying particles. Sandblasting used in the industry is very hazardous, particularly with actual sand as used in this industry. Inhalation of fine silica dust from sandblasting can cause silicosis in a short time. Sand should be replaced with glass beads, aluminium oxide or silicon carbide. Good ventilation

or respiratory protection is needed but lack of proper ventilation and exhaust system has not been seen in this industry.

The industry used coal as the chief fuel it produced various oxides of carbon, oxides of sulphur, VOC, PAH and suspended particulate matter that has a significant effect in human health. It can cause asthma, reduces the ability of blood in combining with oxygen, bronchitis, and nose and throat irritation and can even cause lung cancer. The heat itself can cause hyperpyrexia and burns.

The metal aluminium can interfere with phosphate metabolism of the body and can cause obstructive and restrictive pulmonary diseases.

The industry needs awareness in occupational health and safety and practices and implementation of it or else the workers are vulnerable to a disaster in near future.



Photo 4: Chemical Burn



Photo 5: Chemical Stain on Hands

Child Workers in the Industry



Photo 6: Metal cutting by child workers

The consultants came across 10 child workers of age between 10 to 15 years working in the industry. Nine children came to the industry accompanying their parents. Another child hailed from *Trishuli*, north-west of Kathmandu, came for a better future three months ago in Kathmandu and landed up in heated furnace room of the industry, he works for 8 hours daily and

had a burn with the molten metal two months back, but he claims that he has understood the work well and no accidents and injury can occur to him in future.



Photo 7: A Child Worker



Photo 8: A Child Worker doing
Welding Work

ANNEX II

CASE STUDY: - A PAINT INDUSTRY

A Paint (Coating) Industry located in Bhaktapur was selected for the study; the industry produced solvent based and emulsion based paint products. The industry had 25 male workers working eight hour per day.

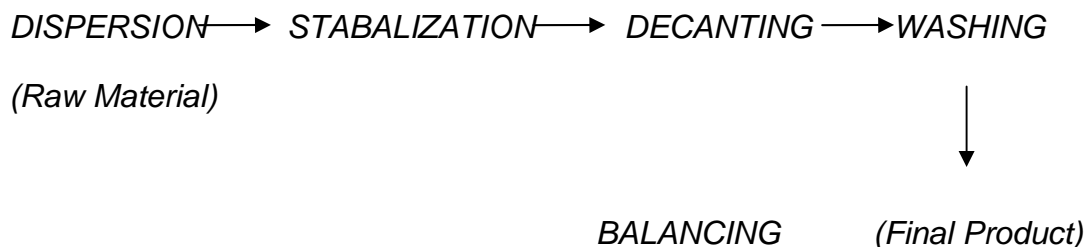
Production Strategy

The term coatings includes paints, varnishes, lacquers, enamels and shellacs, putties, wood fillers and sealers, paint and varnish removers, paint brush cleaners and allied paint products. Liquid coatings contain pigments and additives dispersed in a liquid binder and solvent mixture.

The types of organic solvents used in paint manufacturing process included Mineral Turpentine Oil (MTO) which consists of compound of aliphatic hydrocarbons, aromatic hydrocarbons, esters, Ketones, glycol ethers and alcohols.

Pigments used in the manufacturing process are inorganic or organic compounds that provide coating colour and opacity and influence coating flow and durability. Pigments often contain heavy metals such as cadmium, lead, zinc, chromium and cobalt. The binder increases coating adhesiveness, cohesiveness and consistency and is the primary component that remains on the surface when coating is completed. Binders include a variety of oils, resins, rubbers and polymers.

The production strategy undertaken by this industry for solvent based coating manufacturing process is illustrated by the help of flow chart as under:



The industry also produced emulsion paints ready for use when mixed with water; the principal raw material used for emulsion paint manufacturing were silicates and carbonates of different elements, the raw materials for both types of paints were imported from India.

Raw material handling and preparation of paint products involved inventory storage, thorough mixing operations, thinning and adjusting of coatings as required and transfer of raw material through the facility. A proper monitoring and

handling procedures and practices were followed to minimize the generation of wastes from spoilage and improper.

Working Environment Overview and Waste Produced

The industry was found to be operating under basic guidelines prepared for manufacturing process, the over all working scenario was found to be satisfactory. A staff rest room is provided where the workers changes themselves before proceeding to the work and equip themselves with personal protection equipments like gloves, masks and shoes. A strict working dress code is coordinated by the industry which is followed by each and every worker. The liquid raw material is collected in a tank which reaches to the mixing plant through pipes so there is a less chance of direct contact with the materials however, some chemicals are mixed along in the mixing process which is handled with gloves. Constant mixing and churning up of chemical released fumes, poly aromatic hydrocarbons and VOC's which was perceived by consultants during their visit, improper ventilation and inadequate exhaust mechanism resulted in dispersion of fumes.

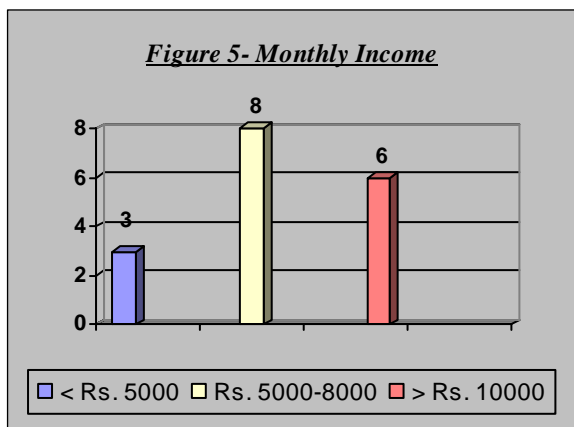
Several waste streams were generated by coating manufacturing processes. Solid waste included empty coating containers, coating sludge and equipment cleaning, spent filters and abrasive materials, dry coating and cleaning rags.

The Solid waste like plastic and some metal scrap were sold by the industry as recycle goods and paper waste generated were incinerated.

Liquid wastes included waste water from surface preparation, equipment cleaning, spills and spent cleaning solutions. No proper liquid waste disposal system was found to be administered by the industry.

The equipment cleaning a necessary, routine maintenance operation in coating manufacturing processes creates significant amounts of hazardous waste, particularly if halogenated solvents are used for cleaning.

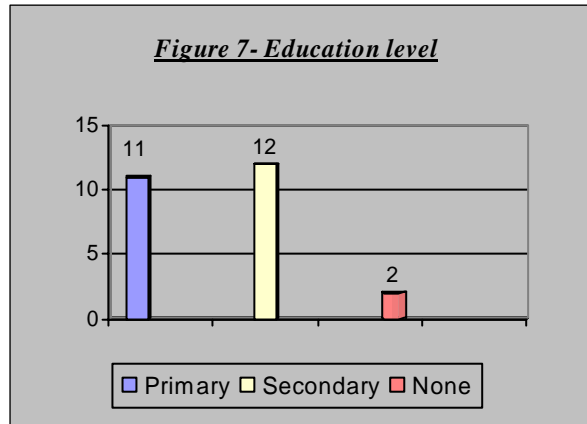
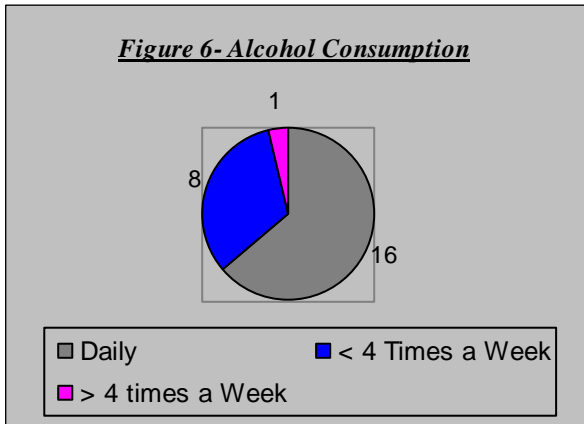
Socioeconomic Condition of the Workers



The majority of the workers working in the industry were living within the fringes of the factory; they were the local inhabitant of Bhaktapur. Twenty respondents were local people where as five of the respondents were migrant workers from different parts of Nepal, all the workers in the factory were found to be male. The educational level of the workers was found to be average, 11 workers had a primary level education, 12 workers

had completed their secondary level education where as 2 workers were found to be uneducated which was a constant threat for their working behaviour they had to interact with some hazardous chemicals which they cannot identify undergoing through the levelling provided so they were constantly being accompanied by the educated workers to facilitate the working procedures. The smoking habit of the workers was found to be high. 20 workers were found to be smoking more than 3 cigarettes per day.

The industry provided medical facilities to its worker and all of the workers and their families were found to be medically insured by the industry, the industry also provided some sort of financial assistance to the worker's children which was highly appreciated by the workers. The industry management also provided a medical check up facility for the workers once a year. Employee motivation strategy by this industry was found to be good a regular gathering of the worker's family and management at a regular time interval created a harmonious relationship.



Occupational Health and Safety in the Industry

The industry was found to be conscious on the occupational safety and management practices, a strict rule has to be followed by the workers and the management claims that the workers has been using their personal protection equipments. However, some of the workers stated that they were accustomed to using equipments as gloves, shoes, ear plugs and dress code but using masks was wearisome and it decreased their work efficiency. The industry claimed that it was following the safety hazard data sheet obtained from its mother industry back in India and not even a single accident has occurred in the industry and the industry is conscious in handling and storing the chemicals. There is a provision of Safety and health training committee in the industry which constantly monitors the environment and occupational health hazards related with the industry.

Possible Occupational Health Hazards and Safety Practices

Solvents used in coatings formulations are hazardous because many are human carcinogens and are flammable or explosive. Most solvents contained in paints generate volatile organic compound (VOC) emissions and poly aromatic hydrocarbons.

Compared to solvent-based coatings, water-based coatings generate between 80 and 95% less VOC emissions and spent solvents than conventional low-solid solvent-based coatings.

Metal cadmium used in paints, dye and pigment industry is a potent enzyme inhibitor and forms metal protein complexes within the cell it gets accumulated in kidney and other tissues with out an obvious symptom of toxicity. Low level exposures spreads over long durations produce chronic pulmonary and renal tubular diseases, skeletal and cardiovascular systems may also be affected in such cases. Morphological changes are rather non-specific consisting of tubular cell degeneration, progressive interstitial inflammatory reactions and fibrosis.

Aromatic hydrocarbon compounds are solids at room temperature and have very low volatility. Depending on their aromatic character, the Aromatic hydrocarbon compounds absorb ultraviolet light and give characteristic fluorescence spectra. They are soluble in many organic solvents, but they are very sparingly soluble in water. Epidemiological investigations have shown an elevated risk of lung cancer for the workers exposed to these chemical groups.

Anthracene is used for the production of anthraquinone, an important raw material for the manufacture of fast dyes. The toxic effects of anthracene are similar to those of coal tar and its distillation products, and depend on the proportion of heavy fractions contained in it. It can cause acute and chronic dermatitis with symptoms of burning, itching and oedema, which are more pronounced in the exposed bare skin regions. Skin damage is associated with irritation of the conjunctiva and upper airways. Other symptoms are lacrimation, photophobia, oedema of the eyelids, and conjunctival hyperaemia. The acute symptoms disappear within several days after cessation of contact. Prolonged exposure gives rise to pigmentation of the bare skin regions, cornification of its surface layers, and teleangiectasis. The photodynamic effect of industrial anthracene is more pronounced than that of pure anthracene, which is evidently due to admixtures of acridine, carbazole, phenanthrene and other heavy hydrocarbons. Systemic effects manifest themselves by headache, nausea, loss of appetite, slow reactions and adynamia. Prolonged effects may lead to inflammation of the gastrointestinal tract.

ANNEX III

CASE STUDY: A TENT INDUSTRY

A manufacturing industry located in Kathmandu was selected for the study; the industry produced Tent, Tarpaulin and Sleeping bags from natural and synthetic fibres. The industry had 60 workers.

Production Strategy

Varied types of natural and synthetic fibres of nylon, plastic sheets, and cotton



Photo 9: Tent Stitching Process

were used to produce the final products; the raw materials were known to be imported from Singapore, Thailand, China and India. The reinforcing metal frame or the pipes of aluminium and iron was found to be collected from the local market. Thus collected raw materials under went processes of stitching, electric stitching and fabrication to produce the finished items. Thus produced finished items

were sold in the local market and imported as according to the production order received.

Working Environment overview and Waste produced

The industry principal waste included metal scraps and metal dust of Aluminium, iron and fibre leftovers. The production management informed that the wastes produced were incinerated in a safe manner. The stitching process produced a considerable amount of noise and under full operation 25 motorized sewing machines produced noise enough to distract the normal procedure of the workers. The workers reported that sewing machine operation required constant attention and focus and minor injury was reported to have occurred.

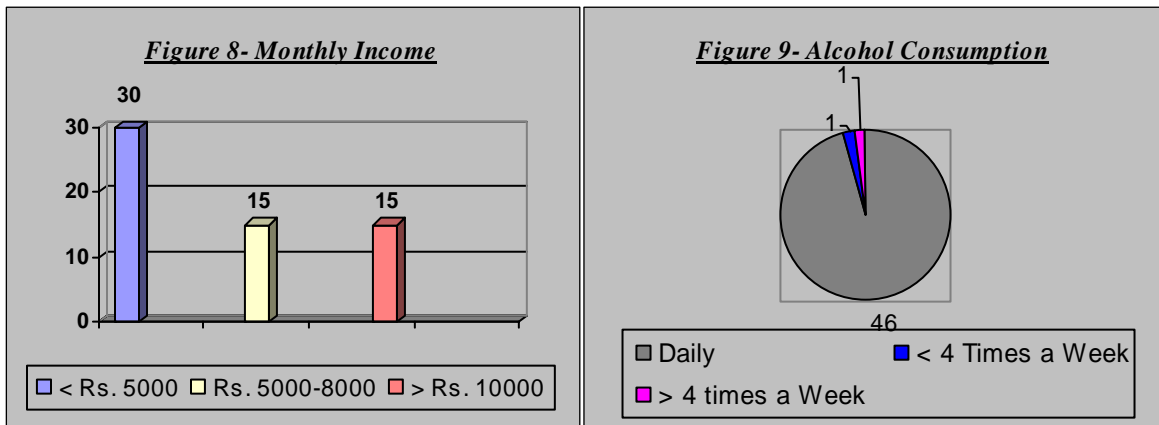
Electric stitching process was used in adhesion of the raw materials using heat, 2 electric adhesive machines under operation also produced considerable amount of smoke, lack of proper exhaust system pose serious health hazard for the workers. The electric stitching machine operating workers claimed that their health was in a state of constant decline and reported to be suffering from sore throat, cough and heavy ness in chest.

Padding used for sleeping bag manufacturing produced considerable amount of fibre dust lay remain dispersed in the industry's ambient atmosphere combined with the fumes produced from electric stitching machines.

Socioeconomic condition of the workers

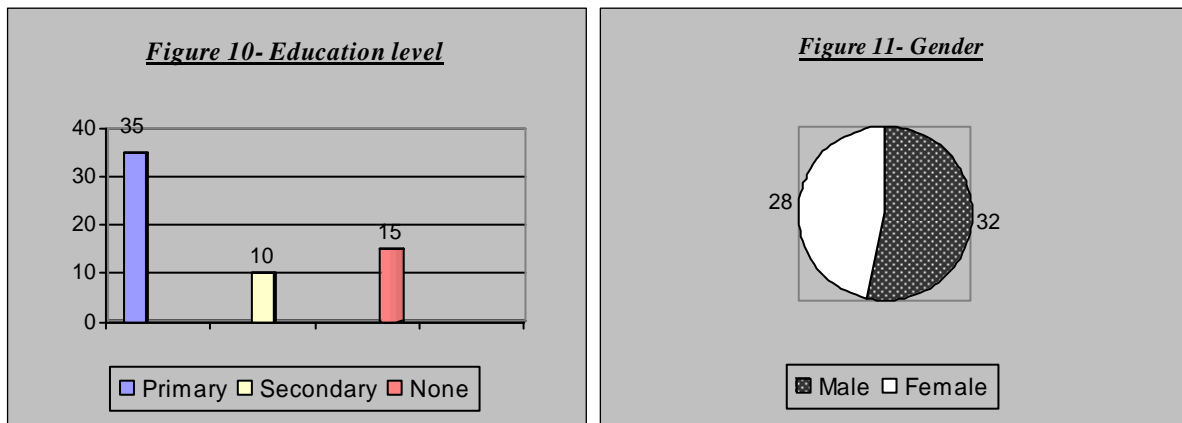
Inland Migrant workers dominated the industry, 45 workers were migrant workers from different parts of Nepal and 15 workers were from the valley. The gender ratio of the workers was found to be even, 28 female and 32 male workers were working in the industry.

The workers lacked formal education only 10 workers reported to complete there basic schooling while majority of the workers had not completed there primary



level schooling. 46 workers were found to be consuming alcohol every day, 25 workers were under the habit of smoking ranging from 2 cigarettes per day to 20 cigarettes per day.

Medical benefits and personal insurance to the worker have been provided by the industry. The income of the workers ranged from Rs.3, 000 to Rs.10, 000 per month working for more than 8 hours per day.



Occupational Health and Safety in the Industry

The occupational health and safety practices in the industry was found to be below average one, the workers and the management had some brief idea however, the ideas had not been implemented by all the workers. The management had strictly advised using mask during handling of fibres and padding material but the worker seem to be lacking the practice. The electric stitching machine produced significant amount of smoke during its operation, together with the fumes from synthetic fibre, neither proper ventilation had been provided nor were the workers using personal protective equipments. Burn cases were found to be common while handling this machine. Sewing operation also required caution; the motorized sewing machine had claimed many minor accidents to the workers.



Photo 10: Electric Sticking Machine

Possible Occupational Health Hazards and Safety Practices

Production of tent, tarpaulin and sleeping bag requires fabrication manoeuvring and the possible occupational health hazards produced in the manufacturing process are the risk of fibres which can cause bronchial irritation and possibly release of histamine like substances by the body. At first, breathless attacks similar to asthma can occur only when the individual is at work. Later, they can become more persistent and chronic bronchitis and emphysema may develop, leading to chronic hypoxia, pulmonary hypertension and right-sided heart failure.

Some threat of mechanical hazards was also observed in the industry mild to severe burning can occur with the electric stitching machine and the motorized sewing machine can pose a threat to injuries in the workers.

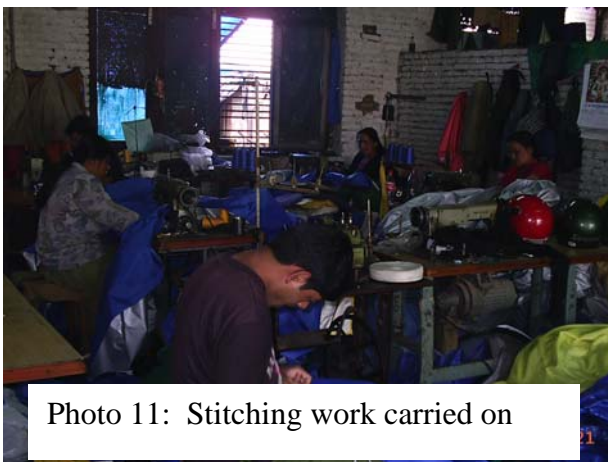


Photo 11: Stitching work carried on

The padding substances used in the sleeping bags manufacturing process is the varieties of fibres woven together; fibre dust, particulate matter and PM_{10} particles can easily enter the body posing a serious threat to the health, hampering the normal functioning of the respiratory mechanism of the workers. None of the workers were found to be

using personal protective equipments while working. It was found that the management have not enforced its workers for using personal protective equipments, majority of the respondent workers knew about the occupational health and safety and few disorders related to their occupation, the worker complained that using personal protective equipment decreased there working ability.

The industry was found to be safe from chemical hazard but the physical and mechanical hazard was very much present and as no preventive measures has been under taken. Lack of preventive measures and occupational safety management can lead the industry in a vulnerable state.

ANNEX IV

CASE STUDY: A DRINKING WATER BOTTLING PLANT

A bottling plant located at Kathmandu was selected for the study; the industry produced bottled drinking water. The plant had 48 workers working on a single shift basis for eight hour per day.

Production Strategy

The raw material and the finished good for this industry was water, water from varied source was collected and extensive filtration processes using sand filtration, charcoal filtration, ozonation, reverse osmosis etc. were carried out to produce final product. The chief source of water for this industry was found to be underground water reserves; a boring plant has been installed in the industry.



Bottling of water was carried by manual and automatic process, in the manual process cleansing of bottles and jars was done with chlorine in a concentration of 200ml/150 litres of water, the treated water was then filled in bottles and jars with automatic process which was stored and supplied.

Photo 12: Filtration tanks

Working Environment overview and Waste produced

The working modality of this industry was found to be rather simple, water from different sources are collected and undergoes various treatment methods. Plastic bottles were found to be imported from Thailand and Singapore which was blown in a blower machine according to the size required. The factory had an automatic plant and minimal human labour force was found to be required.

The waste produced from this industry was found to be water used in various processes, plastic materials and paper. Lack of waste water treatment methods seems to be lagging, chlorine treated water and water from other various sources are directly passed to the sewerage system. Residual chlorine in the open sewerage system can affect the aquatic life if the concentration crosses the permissible threshold limits. The other waste, plastic and paper are incinerated with in the factory premises.



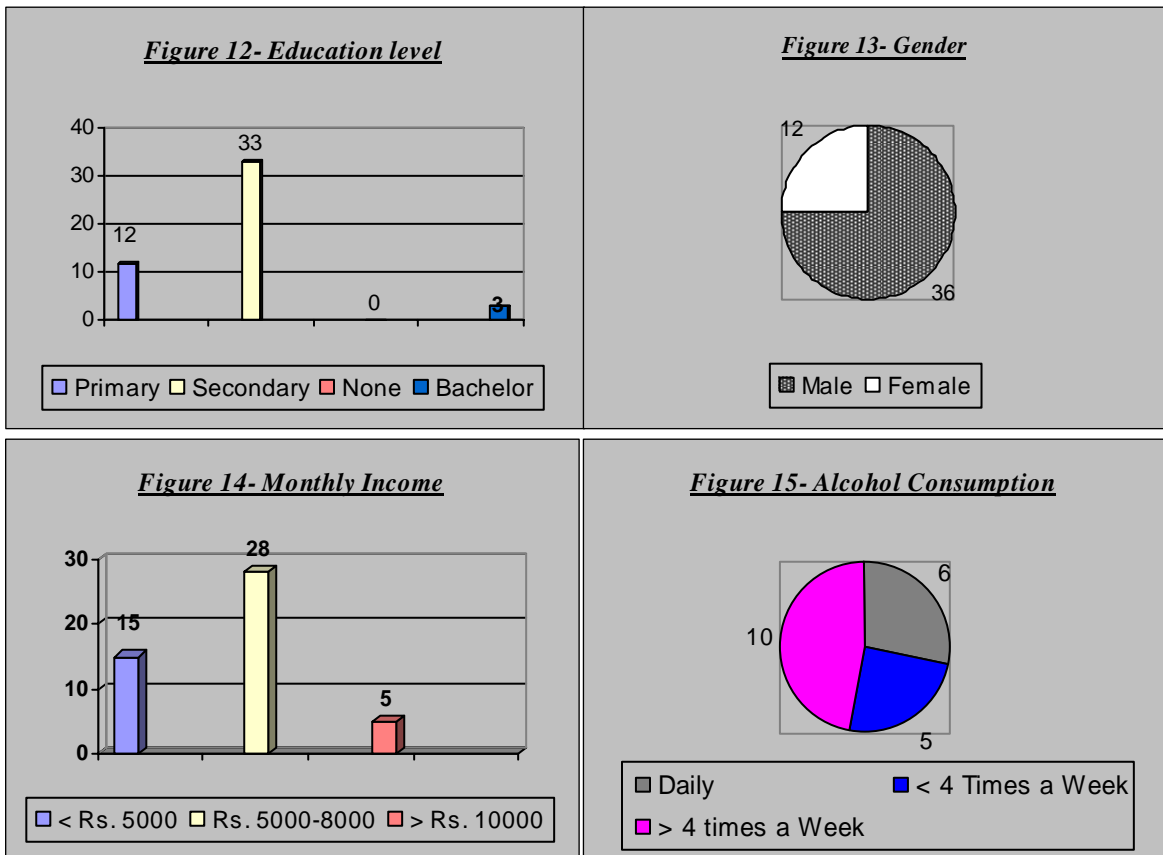
Photo 13: Automatic bottle washing



Photo 14: Reverse Osmosis Plant

Socioeconomic condition of the workers

The industry had 48 employees including the transportation staffs, the gender ratio of the workers was found to be, 12 female and 36 male workers with 3 technical staffs assuring the water quality produced.



The majority of non technical staffs had completed their schooling with 12 workers with their primary level schooling. 6 workers were found to be consuming alcohol every day, 15 workers were under the habit of smoking ranging from 2 cigarettes per day to 20 cigarettes per day.

Medical benefits and personal insurance to the worker have not been provided by the industry. The income of the workers ranged from Rs.3, 000 to Rs.15, 000 per month working for 8 hours per day.

Occupational Health and Safety in the Industry

The bottling industry producing drinking water had practiced personal hygiene and occupational health and safety management; the workers were seen to be using personal protective equipments like apron, masks, gloves and shoes during work. The industry management had strictly issued orders to use the personal protective equipments during the bottling process. However, the cleaning section of this industry, lacked safe occupational health practices, the constant use of chemicals and soap based detergents were carried out with out the use of gloves and masks.

The bottling operations were carried out in a well ventilated and luminous compartment, the over all occupational health and safety practiced in this industry was found to be good.

Possible Occupational Health Hazards and Safety Practices

The occupational health and safety practice in this bottling plant was satisfactory; the workers were found using personal protective equipment like apron, mask and gloves.

Handling of chemicals including chlorine was not found to be coordinated properly, lack of proper skills and improper handling can pose threat to health. The waste water treatment is lagging in the industry and waste disposal and incineration process was carried out rather unscientifically.

The workers possessed ideas on occupational health and safety, a more holistic training is required by the workers for safe working environment.

ANNEX V

CASE STUDY: A BRICK KILN

A brick kiln located in Bhaktapur was selected for the study; the industry produced bricks used for construction work. The factory had 78 workers with 35 children. Most of the workers were seasonal workers migrated from Bihar, India accompanied by their families.

Production Strategy

Most brick kilns in the Kathmandu Valley operate from the month of December till May when the monsoon rain arrives in the valley.

Brick manufacturing generally consisted of two activities in this industry: making of green bricks and brick firing. Green brick making involves selection of suitable clay, preparation of clay by sorting, mixing and tempering, moulding of bricks and drying. The moulding was done manually using wooden moulds. Once the green bricks were ready, they were fired in kilns.



Photo 15: Brick ready for transport

Working Environment overview and Waste produced

The main environmental impact of brick kilns is air pollution due to fugitive and stack emission. Fugitive emissions results during the handling of the bricks before firing and after firing. Stack emission occurs during the firing of the bricks in the kilns. However, this is not the only adverse environmental impact associated with brick kilns. Other impacts include loss of soil fertility.



Photo 16: Child workers carrying brick

Soil of the Kathmandu Valley is characterized with high water holding capacity, rich humus and excellent soil texture suitable for agricultural use. But kilns are erected in these agricultural lands for the sake of economic benefits that are leading to serious loss in agricultural productivity. Setting aside of topsoil for back filling is not a practice in the Valley. This is happening due to negligence of the kiln owners. Once the quality of soil becomes

unsuitable for brick making, the industrialists abandon the site and move to the new location. Loss of topsoil has a negative impact on agricultural productivity due to nutrient loss/low biological potential, but both the parties have grossly ignored this fact and farmers resort to heavy use of chemical fertilizers to revive the soil fertility. This results in further environmental problems.

The high level of air pollution due to brick kilns is primarily due to inefficient technology and poor quality fuel used in the kilns. According to a recent study done by ENPHO (2001), 70 percent of the fuel used by brick kilns is coal, 24 percent is saw dust and the remaining 6 percent is wood and others. Brick kilns normally use coal from Assam, India, which has very high sulphur content.

Besides air pollution and loss of soil fertility, the brick kilns are also causing other environmental problems such as lowering of water table. Low fertility during brick kiln operation time, poor visibility due to air pollution and drying ground water sources are common problems.



Photo 17: Brick kiln

According to the local residents, previously one can easily get water from 4-5 feet below the ground surface. But now days, at the same place there is no sign of water even below 70 feet and most of the water wells got dry. Extraction of topsoil for brick making also increases the possibility of landslides and damage to structures, such as roads and houses.

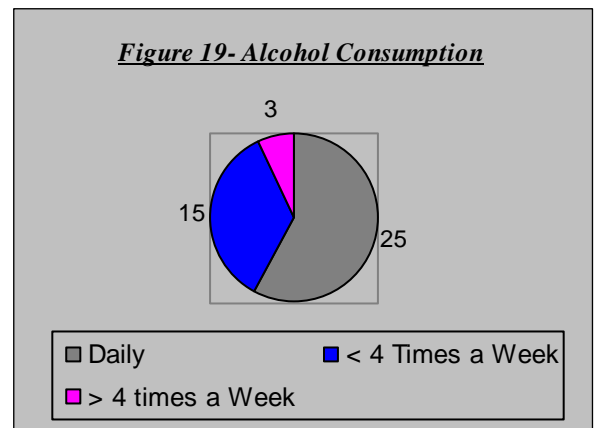
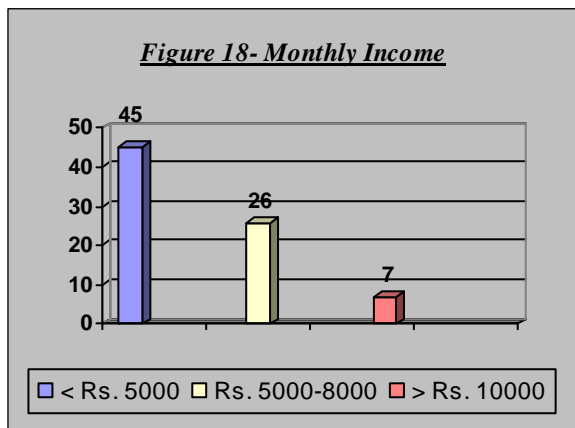
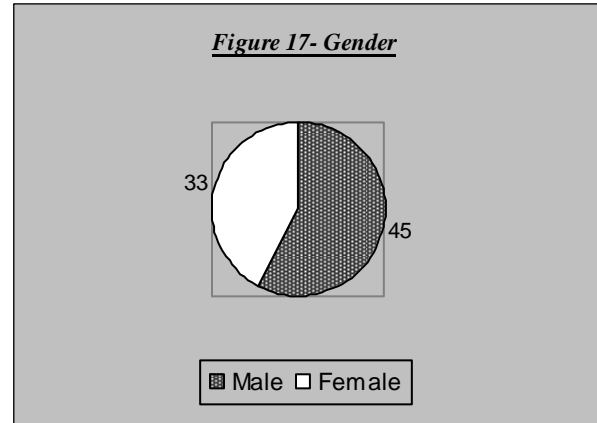
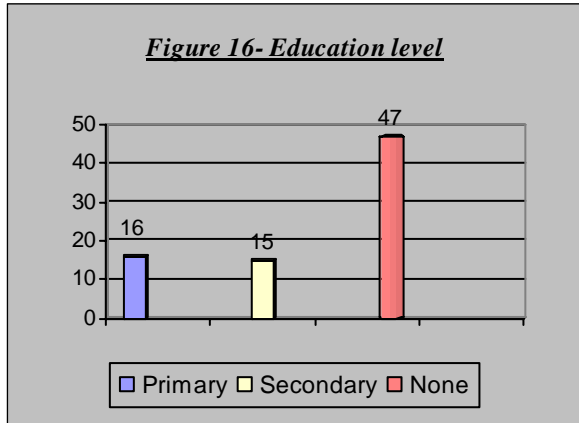
Disruption of irrigation schemes is another problem caused by the extraction of soil for brick making. Some farmers claim that they are forced to give their farms for brick making because their neighbours have done so and as a result the elevation of their land is higher than their the neighbouring plots, which makes irrigation difficult.

Socioeconomic condition of the workers

The industry is mainly dominated by the seasonal migrant workers from India, 65 workers were migrant workers mostly from Bihar, India. Only 13 workers were from different parts of Nepal. The gender ratio of the workers was found to be, 33 female and 45 male with 35 children.

The workers lacked formal education only 15 workers reported to complete there basic schooling while majority of the workers had not completed there primary level schooling. 50 workers were found to be consuming alcohol every day, 65 workers were under the habit of smoking ranging from 2 cigarettes per day to 20 cigarettes per day.

Medical benefits and personal insurance to the worker have not been provided by the industry. The income of the workers ranged from Rs.3, 000 to Rs.10, 000 per month working for more than 8 hours per day.



Occupational Health and Safety Practiced in the Industry

This brick manufacturing industry was found to be not implementing any of the occupational health and safety practices. The workers had no idea on occupational safety practices; most of the workers had inherited the art of brick manufacturing skill from their parents and have not learnt any new lessons on occupational safety. The workers are not trained at all; they simply learned the skill through observations. The management of this industry was found to be aware of occupational safety but has not practice any in the industry, the workers are working in a vulnerable state that can result any possible consequences in near future.

Possible Occupational Health Hazards and Safety Practices Emission from brick kilns comprises of fine dust particles, hydrocarbons (HCs), sulphur dioxide (SO₂), oxides of nitrogen (NO_x), fluoride compounds, carbon monoxide (CO) and small amount of carcinogenic dioxins (if rubber tires were used as fuel) (NESS,

1995). Studies show that inhalation of even relatively low concentrations of fine particles could affect lung function and lead to increases in cardiovascular and respiratory diseases (Sharma, 2002). Higher amount of CO, which is produced in these kilns due to poor kiln design that results in incomplete combustion of coal, could also increase incidence of heart disease.



Photo 18: A worker suffering from musculoskeletal disorder

Epidemiological studies done in different places around the world have found the evidence that increase rate of bronchitis, asthma, decreased lung function, pharyngitis, cough, eye irritation, fibrosis, emphysema allergic, rhinitis are linked with deteriorating air quality due to kilns.

Child workers in the industry

35 children were found to be working in this industry, most of them accompanying their parents. The situation of the children working in this industry is found to be helpless; the children are working for 10-12 hours per day with out any facilities. The wage earned by these children goes to a common fund of the family which is used for their livelihood.



Photo 19: Child workers along with adults

ANNEX VI

CASE STUDY: A STONE CRUSHING PLANT

A stone crusher plant located in Bhaktapur was selected for the study; the crusher plant during its peak season could produce ten thousand kilograms of crushed stones used for construction business. Majority of the crushed stones were used for house construction. The plant had 67 permanent workers with 25 children.

Production Strategy:

The principle raw material used was boulder and gravel, a loose conglomerate of stones that have been mined from a surface deposit, dredged from a river bottom or obtained from a quarry and crushed into desired sizes. Boulder of varied size were brought to the plant in truck, which were carried manually on a 'doko' to the crushing machine, the product was dropped off in a pit also manually carried and piled up to be transported further.



Photo 20: Stone Crusher plant

Working Environment Overview and Waste Produced



Photo 21: Manual transportation of stone

The boulders and gravels were brought to the plant mainly from Kavrepalanchowk and Dhading district, the plant owns two trucks for carrying the boulders with three to five trips each by a truck, during high demand it leases more trucks for fetching the boulders. The boulder are unloaded in the premises of the plant which is carried manually to the crushing plant on a *doko*, physical labour and absence of

mechanical conveyer belt for the boulder transportation has been observed in the plant. The crushed stone is dropped off in a pit below the crusher machine which is carried manually by a shovel and *doko*. The crusher plant is operated according to the demand during normal seasons the plant is operated for 5-8

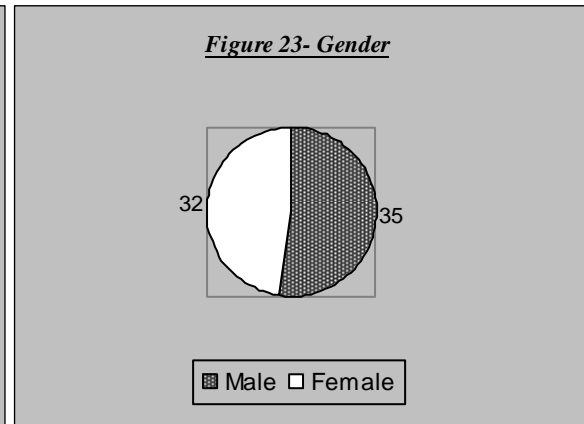
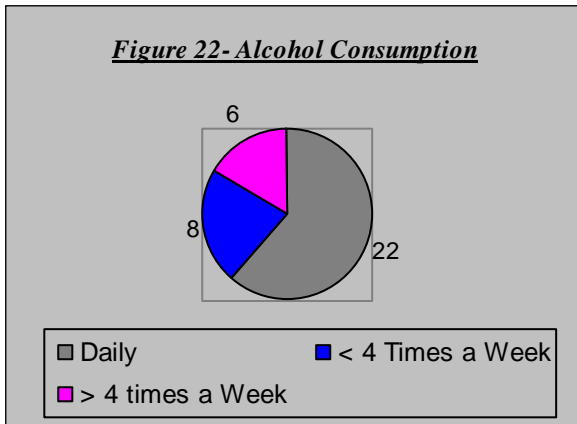
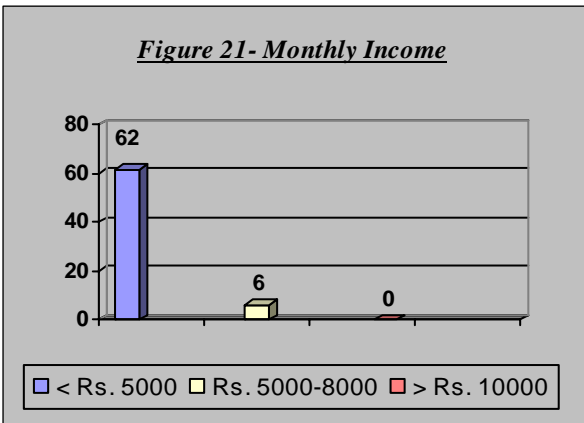
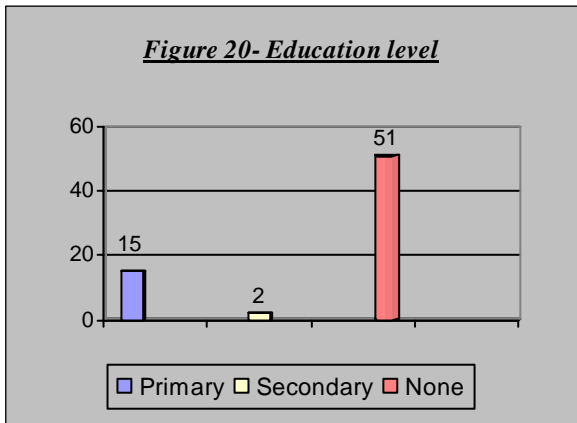
hours per day and during the high demand time which is usually from sep- march the plant is operated for more than 12 hours daily.

The plant under operation produced enormous noise; prolonged exposure can result in hearing impairment. The dust generated from the plant has not only remained confined to its premises but is also affecting the nearby farmland decreasing the productivity of the yield.

Socioeconomic condition of the workers

The stone crushing plant had 45 migrant workers from different parts of Nepal. The male female ratio in this plant was almost equal with 35 male and 32 female workers. 25 children were found to be working in the industry, it was found that majority of the children accompanied their parents to work and finally started working themselves, 12 children were found to be working independently.

The workers lacked formal education and none of the workers encountered had completed their basic schooling, the majority of the workers were found to be illiterate. 22 workers were found to be consuming alcohol every day, the consultant encountered 7 workers working consuming alcohol.



The smoking habit of the worker were also found to be alarming, even the children have started smoking, all together 46 workers were under the habit of smoking ranging from 2 cigarettes per day to 20 cigarettes per day. None of the facility has been provided to the workers by the industry. The income of the workers ranged from Rs. 1,500 to Rs. 6,000 per month working for more than 8 hours per day.

Occupational Health and Safety in the Industry

The basic concept of Occupational health and safety in this plant is found to be missing; the plant management are themselves unaware of health and safety management and practices. Few workers have the only one practice of covering their nose and mouth with a piece of cloth while working.

Possible Occupational Health Hazards and Safety Practices

The principal safety and health hazards to those who work with gravel and boulders include are airborne silica dust, musculoskeletal problems and noise.



Free crystalline silicon dioxide occurs naturally in many rocks that are used to make gravel. The silica content of bulk species of stone varies and is not a reliable indicator of the percentage of airborne silica dust in a dust sample. Granite contains about 30% silica by weight. Limestone and marble have less free silica. Silica can become airborne during quarrying, sawing, crushing, sizing and, to a lesser extent, spreading of gravel.

Photo 22: Crushed finger

Generation of airborne silica can usually be prevented with water sprays and jets, and sometimes with local exhaust ventilation (LEV). Silicosis is prevalent threat to the workers, an elevated risk of mortality from pneumoconiosis and other non-malignant respiratory disease is also a potential threat to the workers.

Chandan B.K' s Experience

Chandan B.K, 19, hailed from Damak, eastern Nepal, and has been working in the plant since two years with out any impediment. His alcohol consuming habit and his negligence during the work almost caused him his finger. 'Last week I was working as any ordinary day, I had been a little tipsy from the drink I had consumed, while lifting up the boulders I couldn't mange to carry it and the boulder landed to the ground smashing my finger, Accidents do happen that is what I used to assume but accidents only occurs due to our negligence that is what I have experienced'

Musculoskeletal problems can occur as a result of manual loading or unloading of gravel or during manual spreading. The larger the individual pieces of stone and the larger the shovel or other tool used; the more difficult it is to manage the material with hand tools. The risk of sprains and strains can be reduced by a simple practice, two or more workers working together on strenuous tasks; can highly reduce sprains and strains. Smaller shovels or rakes carry or push less weight than larger ones and can reduce the risk of musculoskeletal problems.

Noise accompanies mechanical processing or handling of stone or gravel. Stone crushing using a ball mill generates considerable low-frequency noise and vibration. Transporting gravel through metal chutes and mixing it in drums are both noisy processes. Noise can be controlled by using sound-absorbing or -reflecting materials around the ball mill, by using chutes lined with wood or other sound-absorbing (and durable) material or by using noise-insulated mixing drums.



Photo 23: Deformed Knee Joint of a Worker

Child workers in the Plant:



The consultants encountered 25 children in the stone crusher plant. 13 children were found to be accompanying their parents to the work while 12 children were working independently. The independently working children had mostly fled from their house to haunt an opportunity in Kathmandu, 8 children hailed from the nearby by districts of Kathmandu.

Photo 24: A Child Worker

ANNEX VII

CASE STUDY: A CONSTRUCTION INDUSTRY

A construction site was identified in Kathmandu for the purpose of study. 47 workers were found to be working under different thematic areas according to their expertise.

Socio-Economic condition of the Workers

The construction site had 47 workers from different parts of Nepal and India. The male female ratio in this site comprised of 42 male and 5 female workers. 15 children were found to be working in the industry.

All of the workers lacked formal education and none of the workers encountered had completed their basic schooling, the majority of the workers were found to be illiterate. 35 workers were found to be consuming alcohol every day; the consultant encountered 1 worker working consuming alcohol. The smoking habit of the worker were also found to be alarming, even the children have started smoking, all together 38 workers were under the habit of smoking ranging from 2 cigarettes per day to 20 cigarettes per day.

Figure 24- Education level

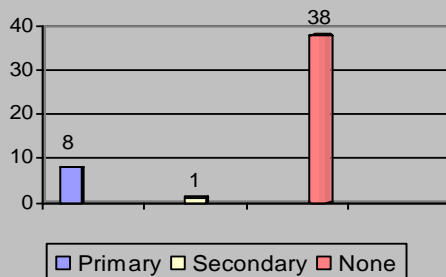


Figure 25- Gender

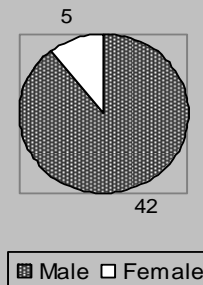


Figure 26- Monthly Income

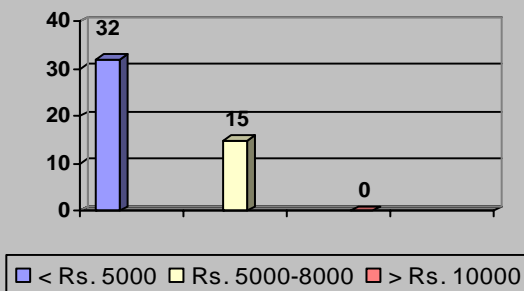
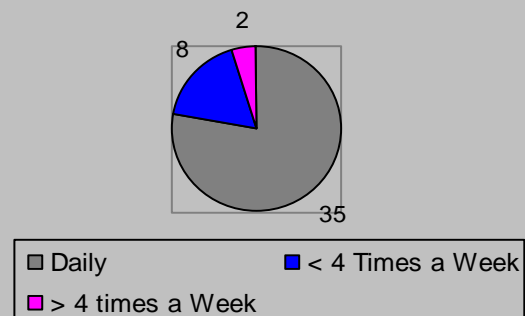


Figure 27- Alcohol Consumption



The monthly income of these workers ranged from Rs. 3,000 to Rs. 7,500 based on their experience and expertise. It was found that single people were working both as a labour and a mason in which he had not received any extra pay.



Occupational Health and Safety in the Industry

The basic concept of Occupational health and safety in this plant is also found to be missing; the plant management are themselves aware of health and safety management and practices, but they are unable to afford personal protective equipments. Few workers cover their hands and feet with plastic sacs during concrete works.

Photo 25: Workers in a Building Construction

Possible occupational health hazards and Safety Practices

The construction business largely depends on bricks, gravel, steel rods, sand and cements. Bricks and dust contain high amounts of free silica, and exposure to them involves a definite risk of silicosis. Cement is a hydraulic bonding agent used in building construction and civil engineering. It is a fine powder obtained by grinding the clinker of a clay and limestone mixture calcined at high temperatures. When water is added to cement it becomes slurry that gradually hardens to a stone-like consistency. It can be mixed with sand and gravel (coarse aggregates) to form mortar and concrete.



Photo 26: Exposure to Cement Dust



Photo 27: Mixing cement without PPE

Respiratory tract disorders are the most important group of occupational diseases in the due to prolonged exposure to cement the result of inhalation of airborne dust and the effects of macroclimatic and microclimatic conditions in the

workplace environment. Chronic bronchitis, often associated with emphysema, has been reported as the most frequent respiratory disease. High incidences of gastro duodenal ulcers have been reported to the workers with a history of cement use. Various skin disorders forms have been observed, including inclusions in the skin, periungal erosions, diffuse eczematous lesions and cutaneous infections (furuncles, abscesses and panaritiums). However, these are more frequent among cement users (e.g., bricklayers and masons). The main eye disease due to frequent cement exposure is conjunctivitis.

Construction workers are exposed to a wide variety of health hazards on the job. Exposure differs from trade to trade, from job to job, by the day, even by the hour. Exposure to any one hazard is typically intermittent and of short duration, but is likely to reoccur. A worker may not only encounter the primary hazards of his or her own job, but may also be exposed as a bystander to hazards produced by those who work nearby or upwind. This pattern of exposure is a consequence of having many employers with jobs of relatively short duration and working alongside workers in other trades that generate other hazards. The severity of each hazard depends on the concentration and duration of exposure for that particular job. Bystander exposures can be approximated if one knows the trade of workers nearby.

Alcoholism and other alcohol-related disease is more frequent than expected among construction workers. Specific occupational causes have not been identified, but it is possible that it is related to stress resulting from lack of control over employment prospects, heavy work demands or social isolation due to unstable working relationships.

Strains and sprains are among the most common injuries among construction workers. These, and many chronically disabling musculoskeletal disorders (such as tendonitis, carpal tunnel syndrome and low-back pain) occur as a result of either traumatic injury, repetitive forceful movements, awkward postures or overexertion. Falls due to unstable footing, unguarded holes and slips off scaffolding and ladders are very common.

There is a greater risk of accidents due to falling of the construction materials. The construction work in Nepal is carried out in a conventional ways with high risk of human life during the work. Accidents can occur due to falling of construction materials, earth or rock, or they occur during transportation. In cement works the main types of accidental injuries are bruises, cuts and abrasions which occur during manual handling work.

Following are the most common Occupational health hazard associated with the construction industry in Nepal:

- Musculoskeletal disorders
- Occupational hearing loss

- Dermatitis
- Lung disorders
- Disorders resulting from improper nutrition, smoking or use of alcohol and drugs

A basic requirement in the prevention of dust hazard in the construction industry is a precise knowledge of the composition and, especially, of the free silica content of all the materials used. Concrete mixing should be done in a properly ventilated area to ensure a pure air supply. Although Mechanization and rationalization have eliminated many traditional hazards on building sites, in some countries but absence of these safer practices has increased fatalities due to falls from height, absence of firm form-supporting frames in construction sites can also result in fatal accidents. On the other hand, Health hazards arise from cement itself, from substances added for curing or waterproofing.

Concrete mixing in Nepal is done by two ways either manually or using machines, majority of construction work are carried out manually, a well ventilated area is a must for the prevention against the dust of bricks, cements and sand. Concrete handling and placing should also be taken carefully, exposure to concrete and cements can pose serious health hazards, use of proper personal protective equipment is necessary. Very few workers have been found using gloves and shoes during the work, majority of the workers wrapped cement bags as shoes and plastic acting both as both gloves and apron.

The main identified occupational health hazard in the construction industry in Nepal is the frame work used in construction, many lives has been claimed by these unscientific and unwarranted platforms. Bamboo is used as a support with metal sheet as a platform tied by rope is used in every construction business, some construction is performed using metal frame using nut and bolts which are relatively safer than bamboo frame work. A proper plat form is a must in this business. The workers should be well informed by their contractors about the consequences and ill effect of construction materials and should be advised to use personal protective equipments (PPE).

Exposure varies with the concentration of the hazard and the frequency and duration of the task. As a general approach to hazard control, it is possible to reduce exposure by reducing the concentration or the duration or frequency of the task. Since exposure in construction is already intermittent, administrative controls that rely on reducing the frequency or duration of exposure are less practical than in other industries. Consequently, the most effective way to reduce exposure is to reduce the concentration of hazards. Other important aspects of controlling exposure include provisions for eating and sanitary facilities and education and training.

A lack of eating and sanitary facilities may also lead to increased exposures. Often, workers cannot wash before meals and must eat in the work zone, which means they may inadvertently swallow toxic substances transferred from their hands to food or cigarettes. A lack of changing facilities at a worksite may result in transport of contaminants from the workplace to a worker's home.

Child workers in the construction site

Fifteen children were found to be working in this construction site; the children's age distribution was from 12- 16 years. 10 children were found to be migrated from different parts of Nepal with 5 children from Kathmandu. The children claimed that they have been exploited by the contractor; they are paid unequally though their work matches evenly as elders. The children in this construction site also claimed that they were frequently abused physically by the elders.



Photo 28 & 29: Child workers carrying heavy loads

ANNEX VIII

CASE STUDY: - AN EMBROIDERY INDUSTRY

An Embroidery industry located in Lalitpur was selected for the purpose of the study; the industry had 32 workers with 18 children. The working hours in this industry was not fixed, depending upon the work load, 8-18 hours of continuous work was found to be done.

Production Strategy

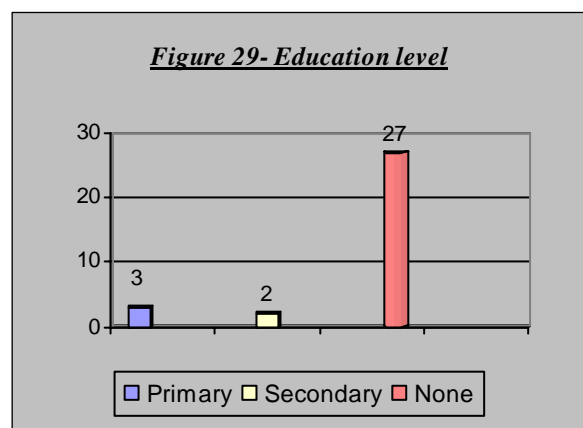
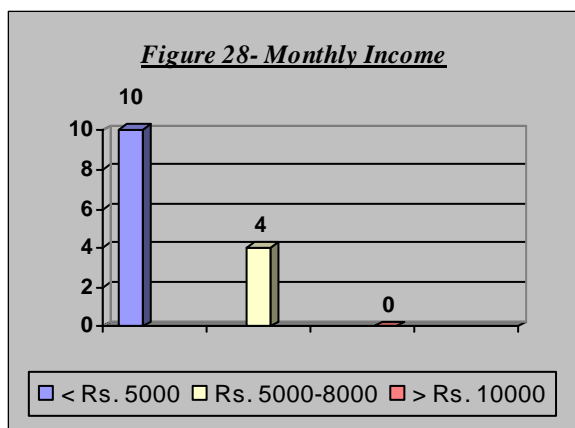
A delicate art work of embroidery was done in this industry chiefly on the *Saree*, *Shawl* and *Salwar Suit*. The clients order design which to be imprinted on the clothes using gold, metal wires, *Sitara*, and metal foils. The cloth piece for embroidery is designed using sewing machine and some prints are even painted using brush, the cloth is framed in a wooden support and the workers with a needle like tool and finishes the job. Depending upon the quality of work to perform 2 human requires 3-8 days of continuous labour to finish the job.



Photo 30: A child worker doing embroidery work

Socio-Economic condition of Workers

The industry was being operated by the migrants from India of Muslim origin, it was found to be a sort of family business with the participation or relatives and close neighbours. The industry had 32 workers from India. The industry was found to be dominated by male workers with nil female employees. All of the workers lacked formal education and none of the workers encountered had completed their basic schooling, the majority of the workers were found to be illiterate. Strict Muslim practices were found to be dominant with none of the



workers consuming alcohol and cigarette. The monthly income of these workers ranged from Rs. 3,000 to Rs. 9,000 based on their experience and expertise. It was strange to know that the children were not paid; they were provided meals and lodging facility and health care facilities, they were allowed once a year to visit their families in India. It was known that the children were not provided with educational opportunities.

Occupational health and safety in the industry

The work in this industry required minute observation and perfect hand eye coordination. The working requires floor sitting arrangements on a precise posture for a longer duration. Constant ocular stress leads to various eye problems and prolonged analogous sitting posture also produces stress in the spinal cord and affects the musculoskeletal system.

The fine metal piece and other minute synthetic material used in embroidery can be inhaled leading to respiratory systems problems.

The minute work required well aerated and luminous room but the industry lacked both this can lead to health deterioration of the workers.

Possible Occupational Health Hazards and Safety Practices

The job performed is repetitive in nature and requires greater hand eye coordination and a prolonged similar sitting posture; the industry should primarily focus on operating a short working hour with frequent short break from the work. Proper ventilation and luminous room should be provided to the workers for greater productivity and safe health of the workers.

Child Workers in the Industry

The consultants came across 18 child workers of age range between 8- 16 working in the industry. All the children working in the industry had gained the skill of embroidery in India and told that they came to Nepal for a better future.



Photo 31: A child doing embroidery work



Photo 32: Children doing embroidery work

ANNEX IX

CASE STUDY: AN INSTANT NOODLE INDUSTRY

An instant noodle manufacturing industry located in Kathmandu was selected for the study. The industry had 72 workers working on different departments of the industry working for 8 hours daily.

Production Strategy

The industry produced instant noodle of different varieties and brand names, the



Photo 33: Noodles ready for frying

noodle industry required flour as the chief raw material for noodle manufacturing. The flour was carried on a conveyer belt to a dough making machine, thus formed dough was passed to another machine for flattening, and flattened dough is then cut in a noodle shape in a different machine. The noodle is then steamed, flavoured, fried and packed together with seasonings.

Working Environment Overview and Waste Produced



Photo 34: Shaping noodles

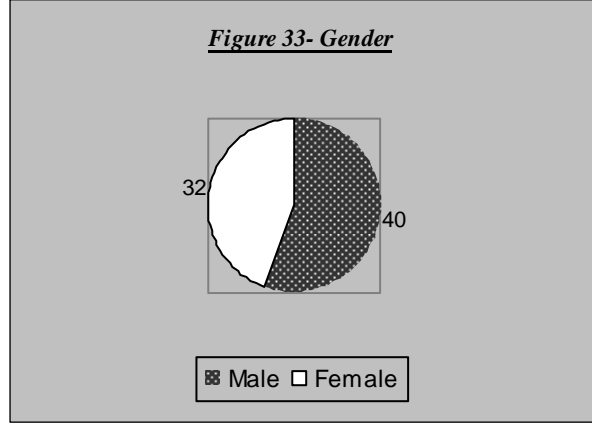
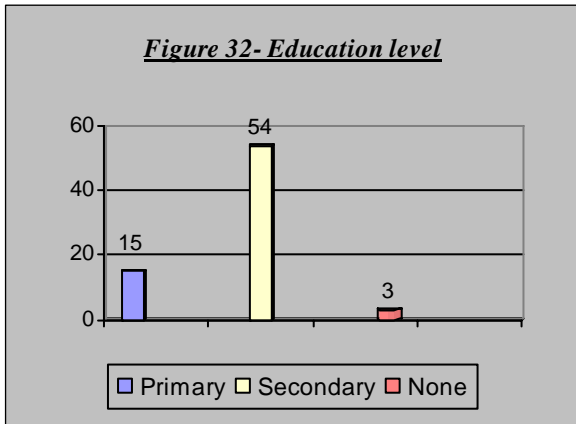
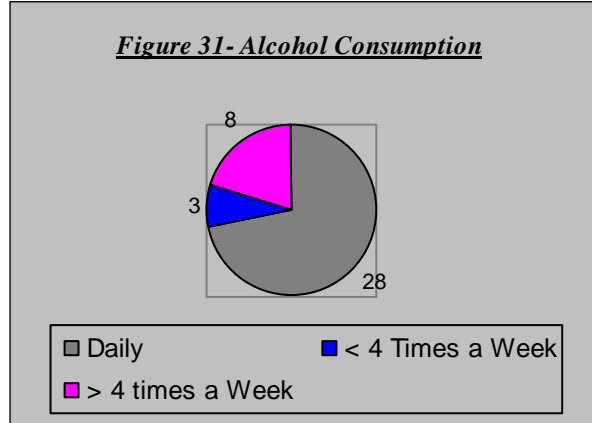
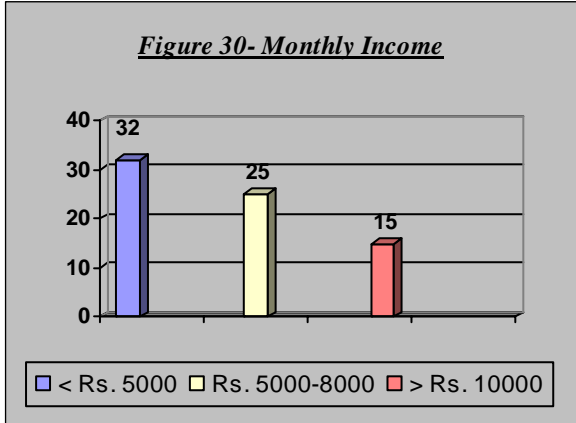
The industry principle waste included plastic, paper and diesel smoke generated from the boiler. Considerable amount of noise was generated during boiler and machine operation. The infrastructure and hygiene of the production area of this industry was found to be satisfactory. Lack of proper incinerator mechanism produced considerable amount of smoke to the ambient atmosphere.

Socioeconomic Condition of the Workers

The industry had 72 workers with majority of them as migrants workers, 48 workers had migrated from different parts of the country. The gender ratio was

evenly poised with 32 female and 40 male workers. Most of the workers had completed their basic schooling. 28 workers were found to be consuming alcohol every day, 38 workers were under the habit of smoking ranging from 2 cigarettes per day to 20 cigarettes per day.

Medical benefits and loan are provided by the industry to the worker, the income of the workers ranged from Rs.4, 500 to Rs.15, 000 per month working for 8 hours per day.



Occupational Health and Safety in the Industry

The industry was found to be aware on the occupational safety and management practices, a stern regulation had to be followed by the workers and the management claimed that the workers had been using their personal protection equipments. The workers were found to be biding the rule; apron, gloves and shoes had been worn by majority of workers but the use of mask in the industry was scarce, when inquired the workers told that using mask gave them an eerie felling. The boiler section of the industry produced considerable amount of noise but the ear plug was found to be missing with the operator. The incineration

mechanism followed was however primitive for the industry, conventional method of incineration was still followed in the industry.



Photo 35: Noodles on a conveyer

Possible Occupational Health Hazards and Safety Practices

There were various grounds of occupational health and safety practices to be followed by the industry. The industry should primarily focus on strict use of mask and clean gloves, this practice will not only ensure the safe health of the workers but also being a food industry it should focus on the personal hygiene and sanitation practices.

Ear plug in heavy machine operation section should be provided to the workers. The industry had also received a formal training on occupational health and safety practices from HMG, Occupational Health and Safety Project, the training resulted in a construction of a conveyer belt for transporting flour which was previously carried manually. The industry claims that the use of personal protective equipment was the out come of formal training, workers seems to understand the use and advantages of occupational safety practices.



Photo 36: Sorting of noodle cakes



Photo 37: Noodles ready for packaging

ANNEX X

CASE STUDY: -A CARPET INDUSTRY

A Carpet manufacturing industry located in Bouddha was selected for the study, although the management of the factory did not allowed the consultants for carrying out the study finally after a long negotiation the management agreed on the following two points ground:

1. Name of the industry not to be announced
2. No photographs allowed.

The factory produced carpets of varied sizes and quality and had 86 workers with 32 children.

Production Strategy

The principle raw material used in the factory was wool which was purchased from the local market or imported from China. The cost of the wool depended upon the variety and quality. The wool was then threaded; this factory did not have dyeing facilities so it has been sending the wools to dye in a factory located at Sohrakutte, Kathmandu. Dyed wool is then weaved in a wooden machine, one normal size carpet would require approximately 20-25 days of weaving by a single worker. Depending upon the size and design it would even take longer time for carpet production.

Working Environment Overview and Waste Produced

The carpet factory was found to be concealed from the outer world, a shade has been constructed with out proper ventilation and lighting facilities. The workers told that they have been working in a similar situation since the establishment of the factory. The chief waste produced by this factory included scrap of wool and fibres.

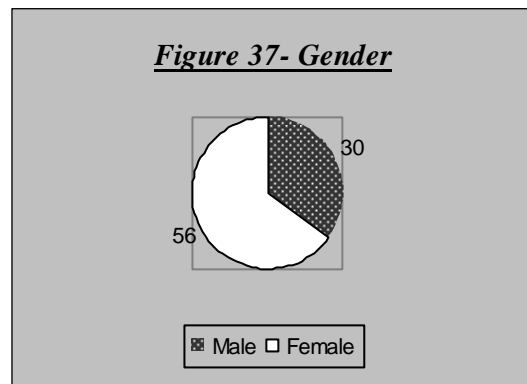
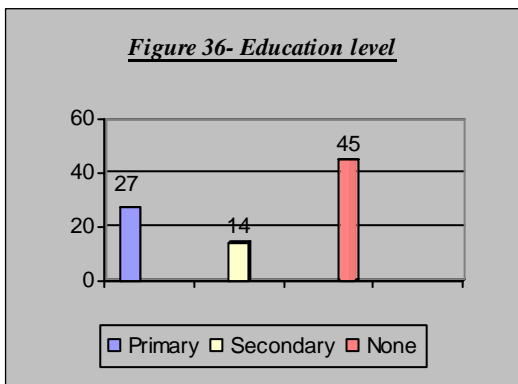
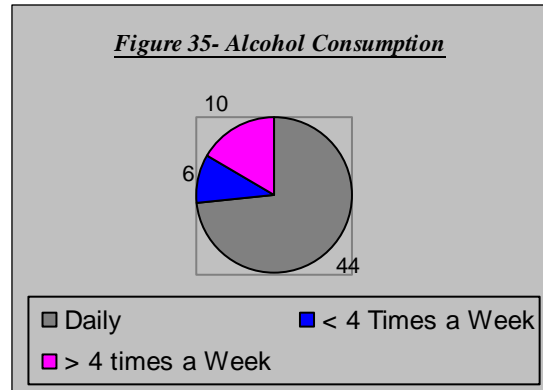
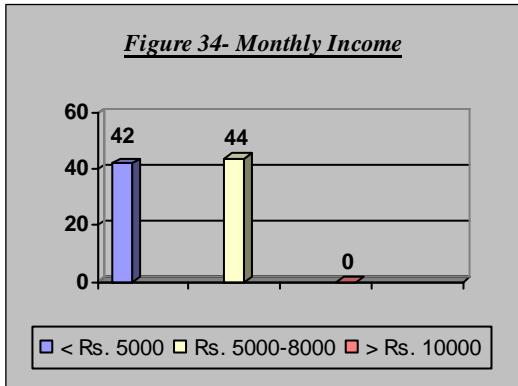
Socioeconomic Condition of the Workers

Migrant workers dominated the industry, 53 workers were migrant workers from different parts of Nepal. The female workers were dominant over the male workers with 56 female worker and 30 male workers. 32 children were found to be working in the industry, it was found that the children accompanied their parents to work and finally started working themselves.

The workers lacked formal education and majority of the workers encountered had not completed their basic schooling, only 14 workers were found to have completed their schooling, the average workers had just completed their 4 years in school.

44 workers including both male and female were found to be consuming alcohol every day, 57 workers were under the habit of smoking ranging from 2 cigarettes per day to 20 cigarettes per day.

The income of the workers ranged from Rs. 3,500 to Rs. 8,000 per month working for more than 8 hours per day.



Occupational Health and Safety in the factory

The occupational health and safety practices in the factory was found to be insignificant, few workers had the practice of covering their mouth and nose during weaving, apart from this practice nothing significant has been observed. The workers are unaware of occupational health and safety practices. The factory management also seemed to be showing less concern over this issue. The unventilated and murky room of factory can also be responsible for creating significant possible hazards. Large number of workers confined in an unventilated room posed a serious threat for spread of respiratory diseases. Significant threats of biological hazard persist in this carpet factory.

"I have been sexually exploited and Physically abused"

Mamata Tamang, 21, hailing from Dhading told that she had been sexually exploited and physically abused by her male co-worker. 'I had been sexually exploited a number of times by my co-worker, on informing the factory management I didn't receive any justice, instead I was bashed up by him who allegedly raped me, I have no place to go and I don't have any relatives here, I dared and spoke this matter but alike me there are many but they remain silent' told Mamata sobbing. The carpet factory has clearly become a fertile ground for physical abuse and sexual exploitation.

"He infected me with Tuberculosis"

Hira Bahadur Gurung, 29, from Makwanpur, told that closed nature of factory without any ventilation infested him with tuberculosis. 'Last year I started loosing my weight and developed TB like symptoms, under medical treatment I was diagnosed with TB, there was a worker called Jivan Budha Magar, he must have transmitted me the disease, he had the similar symptoms. He had left the factory soon after my diagnosis; I don't know where he is'. 'I have fully recovered now, I think that our room and this closed environment must have transmitted me the disease, have it been an airy and open room, I would have not been infected'

Possible Occupational Health Hazards and Safety Practices

The carpet factory posed a series of physical, biological, psycho social and mechanical hazards. The unventilated, dark and overcrowded room can lead to various respiratory disorders and transmission of air borne as well other infectious diseases. Lack of proper lighting facility with minute nature of job to perform can lead to various eye diseases.

These factors along with the incidence of low salary, physical abuse and sexual exploitation can also harness psycho social hazards to its workers.

The repetitive nature of job requiring hand eye coordination and constant movement of appendages for 8-10 long continuous hours and poor working posture can also develop musculoskeletal disorder in the workers. Use of outdated and noisy equipment and sharp instruments may lead to an accident.

Child workers in the factory

There were 32 children working in the factory, most of the children accompanied their parents to work and have started working, few children had runaway from their house from different parts of nation and landed up in carpet factory. The

children worker once entering in the world of carpet factory has no escape, they neither have developed expertise in other field nor do they have any contacts with the outside world, they are left with no choice but to work as a bonded labour in these carpet factories.

“I want to go to School”

Dhiraj Bahadur Karki, 14, from Dolakha told that he wanted to go to school and become a respectful man in the society. ‘I am from Dolakha district and I ran from my village when I was 10 years old, nature had fooled me, my father died and my mother eloped with someone, I had one big brother and sister, both of them were bigger than me and were working, I was the smallest son, after my mother eloped and both my brother and sister vanished, I had no choice but to flee from my village, I was studying then at class 2 in the village school. “After I came to Kathmandu I started working in a hotel as a dishwasher, I found one village brother in Chabahil and he introduced me in this world of carpets”. “My father always wanted me to study and become a learned man but all his dreams and my destiny is shattered with his death”, “Can you arrange me in school, I want to study” asks Dhiraj.

ANNEX XI

Workplace Occupational Health Assessment Form (Institute of Occupational Health, University of Birmingham)

GENERAL
Company name
Location of workplace
Number of workers exposed
List of substances used
Physical state (dust, fibre, gas etc.)
Mode of exposure (inhalation, skin)
Toxicity class (toxic, very toxic etc.)
Known occupational exposure
Toxic effects of each substance
SOURCE OF EXPOSURE (section outlines how the substance(s) come into contact with the workers)
<i>Storage</i> (description to include type of container, location, method of opening and storage)
Are leaks possible? Yes / No If yes, give method of prevention if any
.....
<i>Packaging and labelling</i>
Is suitable packaging and labelling provided? Yes / No If No, what improvements should be done
.....
<i>Transport and transfer</i> (describe how substances are moved from store to point of use).....
.....
Is inhalation or skin contact possible? Yes / No
Are spills possible? Yes / No
If yes, describe the methods of control
.....
<i>Use</i> (describe how substance is used)
Is inhalation or skin contact possible? Yes / No
If yes, describe the methods of control
.....
<i>Emissions to atmosphere</i> (describe what is likely to be present in any emission to outside atmosphere)
Are these emissions likely to cause any environmental pollution? If yes, how to minimize?
.....
<i>Waste products</i> (describe what products and how they are disposed)
.....

Is inhalation or skin contact possible? Yes / No If yes, describe the methods of control
MONITORING
<i>Workplace monitoring</i> Are airborne concentrations monitored? Yes / No If yes, state frequency and if no, state whether measurements should be taken..... Do the results show that a hazard to health exists?.....
<i>Health /medical surveillance</i> Is Health /medical surveillance undertaken? Yes / No If yes, give collective results and if no, state whether surveillance should be undertaken and give details.....
<i>Biological monitoring</i> Are biological measurements done? Yes / No Do results of health surveillance or biological monitoring show any risk to health? If yes, give details
CONTROL
<i>Ventilation methods of control</i>
<i>Protective equipment</i> If protective equipment is used, describe the type used and method of selection, inspection and maintenance
Is protective equipment in good order and suitable? Yes / No If no, what is required?
Other methods of control not mentioned above.....
<i>Training</i> Does any of the work methods described involve special training? Yes / No If yes, give details..... Is any training given with regard to health and safety aspect of the work? Yes / No If yes, give details
Is this training adequate to minimize the health risks? Yes / No If no, give details of extra training
<i>Welfare and personal hygiene</i> List the provisions for welfare and personal hygiene
Are these provisions satisfactory? Yes / No if no, what improvements should be done
<i>Health and safety works sheets</i> Are any Health and safety works sheets issued? Yes / No If yes, append a copy, if no, append a draft if possible.....

ANNEX XII

Additional Information on Occupational Hazards in supplement to Annex XI for a Walk through Survey

Comment on the following occupational hazards:

Use of equipment

- Rotating / moving parts
- Free movement
- Machine / vehicle movement
- Fire explosion

Biological agents

- Viruses
- Bacteria
- Fungi
- Protozoa
- Algae
- Parasites

Work practices and premises layout

- Hazardous surfaces
- Working at height
- Awkward postures / movement
- Confined space
- Slips / trips

Chemical agents

- Dust
- Fibre
- Fume
- Smoke
- Mist
- Liquid
- Gas
- Vapour

Electrical

- Electrical switchgear
- Electrical installations
- Electrically operated equipment
- Portable electric tools

Physical agents

- Electromagnetic radiation
- Noise
- Vibration
- Heat
- Light
- Ionising radiation
- Non-ionising radiation

Psychological factors

- Intensity / monotony of work
- Role ambiguity / conflict
- High demand / low control
- Contribution to decision making

ANNEX XIII
Questionnaire on Occupational History

Workplace (Employer's address)	Dates worked from	Dates worked to	Full/ part time	Describe type of industry (mining, agriculture, wood, chemicals, metals etc.)	Known health hazard in the work place (heat, dust, chemicals etc.)	Describe job duties	PPE used	Were you ever off work for a health problem?

ANNEX XIV
Questionnaire for Health Survey

Name _____ Age/sex _____

Name and address of workplace _____

History of Previous accidents _____

1. GENERAL

Weight _____ (Kg) Height _____ (cm) Pulse _____ per min BP _____

Temperature _____ Respiration Rate _____ Pallor [] Icterus [] Cyanosis []

Lymph nodes enlarged [] Not Enlarged [] Appetite Normal [] Poor []

2. SKIN

Allergic Dermatitis / Eczema Yes [] No [] Location _____ Any other skin lesions including stain of chemicals _____

3. EYE

Conjunctiva [] Cornea [] Glistering Moist [] Dry and Wrinkled [] Any Spot []

Eyelid [] Visual Acuity RE [] LE []

Light Reflex RE [] LE [] Colour Blindness RE [] LE []

4. ENT

• Ear → Pina [] Wax [] • Nose → Normal [] [PNS / Polyp / Discharge]

• Throat → Tonsil Lt [] Rt []

5. CHEST

Inspiration [] Expiration [] Normal [] Abnormal [] Specify _____

Lungs _____ Heart _____ Lymph Nodes _____

Any Other _____

6. ABDOMEN

Distension Yes / No Liver _____ Spleen _____

Kidney _____ Hernias _____

Hydrocele Yes / No _____ Varicocele Yes / No _____

7. EXTRIMITIES

Deformity _____ Calluses and stigmata _____

Varicose veins Yes [] No [] Swelling Yes [] No []

8. PEAK FLOWMETRY RATE

I [] II [] III [] Best One []

9. IMPRESSION/COMMENT _____

Date:

ANNEX XV

Questionnaire for Socioeconomic Survey

Date:

Name and address of the Industry:

1. Name:
 2. Age: Sex: Male Female
 3. Address:
 4. Education level: None Primary education Secondary education
University education
 5. Number of Family members:
 6. Number of people in family working:
 7. Total family income per month: Rs..... Per capita income
 8. Numbers of Children, they study/work.....
 9. Alcoholism: Yes No , if yes, than consumption is: Rarely (Once a month) Occasionally (More than 4 time a month) Often (More than 4 time a week)
 10. Other practices:
 - a. Smoking
 - b. Chewing Tobacco
 - c. Pan Masala and Ghutkas
 - d. Others, If any:If have ever smoked,
Age at start:years. Duration (yr.) <20 20-40 >40
Cigarettes/day: Age at major change in smoking habit:
 11. Number of working days and working hour per day:
 12. Benefits provided by the employee:
 - a. Medical
 - b. Housing
 - c. Feeding
 - d. Others, if any
 13. How would you describe the working environment and infrastructure of your working place?
 - a. very good
 - b. good
 - c. fair
 - d. very bad.
 14. Have you heard of occupational diseases? Yes, No
 15. Has any occupational safety practices been promoted by the industry you work in?
Yes No
- If yes, mention them

ANNEX XVI: Status of Child Labour in Nepal

ACTIVITY/ OCCUPATION	WHAT? Task	HOW MANY? Number of child labourers	WHO? Gender, ethnic group	WHERE? District, urban/rural	WHEN? Seasonal, work time/hours	WHY? Specific causes	Source
Slavery & Forced Labour	Animal grazing, domestic chores, child minding, farm work	17, 152 (5 ~ 18 years) among <i>ex-kamaiya</i> 's family	Mainly Tharu communities Girl-48%	In <i>ex-kamaiya</i> rural areas- Dang, Banke, Bardiya, Kailali and Kanchanpur And Urban area like Kathmandu & Pokhara	Regular Working hours-12 to 14 hours	Poverty (food) Loan tied up with family labour contract	Bonded Labour Among the Child Workers of the <i>Kamaiya</i> System: Rapid Assessment, Shiva Sharma et al (NLA, ILO/IPEC), 2001
Prostitution	Commercial sex work	~ 150 in Kathmandu and ~ 200 in Nepalganj alone ~ Other areas not known Some of the 185 estimated <i>Badi</i> sex workers	Girls of ages 6 – 18 years; from marginalised families; school girls <i>Badi</i> children	Bus parks and dance restaurants in Kathmandu Valley; lodges in urban centres; shops along highways <i>Badi</i> areas (Dang, Bake, Bardia, Kailali, Salyan, Kanchanpur)	Mainly night and afternoon time	Raped; mother a prostitute; parents' earning source; income for own luxuries; For <i>Badi</i> -tradition, lack of alternative opportunities.	Social Watch Group survey report for Kathmandu; updated with BISCONS field visits. Field visits by BISCONS.
Trafficking in People (a Process and not an activity)	Trafficked for prostitution, circus and domestic work	Many of the 5-7,000 girls trafficked to India annually are < 18 years	Mostly girls from indigenous communities.	Mainly from impoverished hill districts in Central Dev. Region to mostly India	Any time	Poverty & lack of awareness; ambition of good earning; morally corrupt parents/guardian	Field study by BISCONS
Drug Peddling	Cross border trafficking and sales.	Mostly children are involved in such activities	Street children, child porters and hawkers,	Trafficking across Nepal –India border. Selling in	Any time	For good income, used by adults, unsuspecting for	Field study by BISCONS

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			school children	tourist areas of Kathmandu		police	
Armed Conflicts	Sentry; cooking; singing and dancing; messengers Maoist insurgency	Could be thousands in number	Adolescents; mainly from backward ethnic communities	Maoist affected areas	All time	Poverty; frustration; for revenge; unsuspecting for police; easy for political orientation	Media, human right organisations and field study by BISCONS
Scavenging & Rag Picking	Picking plastics, metals, bottles and selling	18 years & younger – 4,000	Girl – 12% Kami, Damai, Sarki – 21 %, Brahmin/Chhetri – 18% Tamang, Terai communities, Magar & Muslim – 49%	Urban centres only, Migrated – 64% From Hill/mountain – 47%, From Terai – 33% From India- 16%	Regular, Morning time mostly, Mean working hours - 6	Migration/leaving home Friends influence – 49% Self – 27% Parents/relatives – 24%	Situation of Child Rag Pickers in Nepal – Bal Kumar K.C. et all (CDPS, ILO/IPEC), 2001
Portering	Long distance & short distance carrying loads	Less than 18 years – 46,029 in the country	Girls – 12% Rai, Limbu, Gurung, Magar & Sunwar –24% Kami, Damai, Sarki – 22% Chhetri – 19%Newar – 11% Tamang – 10%	Urban & rural trade centres, bus parks; Migrated from rural areas – 91%	Long distance portering – 78% seasonal Short distance portering – 70% regular Avg. Weight carrying, girls – 29 Kg (short distance) Boys – 37 Kg (short distance) Girls – 33 (long distance) Boys – 56 Kg (long distance)	Working seasonally to supplement household – 59% (short distance) To earn money – 47% (long distance)	Child Porters in Nepal: A Rapid Assessment – Bal Kumar K.C. et all (CDPS, ILO/IPEC), 2001
Domestic Service	Kitchen work, dish washing,	Less than 14 yrs. – 21,000 in	Girl – 46% at	Used in urban centres; Migrated	Regular,	Parents advice – 83%,	Situation of Domestic Child

Nepal Health Research Council

	house & cloth cleaning, child minding	Kathmandu 43,000 in the country	Bramhin/ Chhetri, Tharu, Tamang, Magar, & Newar, – 84%	from Neighbouring and <i>Kamaiya</i> District – 45%	12 to 16 hours – 94%	Own choice – 12%	Labourers in Kathmandu: Rapid Assessment- Shiva Sharma et al (NLA, ILO/IPEC), 2001
Overland Transportation	Fare collector in Micro-bus & Tempo (auto-ricksaw)	Less than 18 yrs. – 395 in Kathmandu valley	Girl – not observed Mostly Newar, Tamang and Bramhin	Urban centres	Regular; Mostly working from early morning 6:00 am till night 8:00 PM	Earn money for parental support and extra pocket money, to become a driver in future, enjoyment in the job	A Collective Campaign to Eliminate Child Labour in Tempo & Microbus- Tarak Dhital (<i>Bal Sarokar</i> , No.40-41, CWIN), 2001; Field observation
Carpet Factories	Weaving, spinning, carding, dyeing, washing	Less than 14 yrs.- 1,900 in the country	Girl – 39% Tamang, Magar, Newar & Chhetri,	Factory Concentration in Kathmandu Valley. Origin of the labour- Makwanpur & Sindhupalchwok, Sarlahi, Kavre, Jhapa & Ramechhap	Regular, No fixed time Mostly work 12~16 hours a day	Poverty, Migration of family members & attraction of city (<i>Rahar</i>) lure of character-11%	Situation Analysis of Child Labour in Carpet Industry of Nepal-Centre for Policy Studies (RUGMARK/ UNICEF), 1999;
Brick & Tile Kilns	Digging, kneading, moulding, pilling, drying &, carrying	Less than 14 yrs- 959; (14 ~ 18 yrs.) 1034; Total- 1993	Newar, Chhetri, Tamang, Magar – 76%	Origin- Kavre, Bhaktapur, Ramechhap & Rolpa – 61%	Seasonal (When free from the agriculture works); Working(> 8hours a day) – 40%; 7days a week – 79%	For income generation, seasonal migration with Families,	Child Labour in Brick Kilns of the Kathmandu Valley – BISCONS (HMG/MOL, ILO/ IPEC), 1998

(Source: National Master Plan on Child Labour 2001-2010)

ANNEX XVII**Worst Forms of Child Labour & Consequences**

Activities	Tasks	Hazards	Consequences
Slavery & Forced Labour	Bonded labour as domestic chores, animal grazing, child minding, farm work	Human rights abuse, long and arduous working hours.	Moral suppression, psychological trauma, social exclusion, deformity.
Prostitution		Mental/physical abuses, STD including HIV/AIDS, etc.	Social exclusion, family rejection, pregnancy, death.
Trafficking in People (a process)	Rural-urban & cross border trafficking for use in prostitution, circus, etc.	Human rights abuse, physical and mental abuse, sexual abuse.	Moral suppression, psychological trauma, social exclusion, organ removal and death.
Drug Peddling	Carrying and selling drugs.	Drug addiction, HIV/AIDS, etc.	Psychological trauma, death.
Armed Conflicts	Carrying guns and fighting, carrying loads, digging, etc.	Physical and mental abuse, sexual abuse, human rights abuse, long working hours and dreadful work.	Psychological trauma, injuries, disability or death.
Scavenging and Rag Picking	Reclaiming usable materials (metals, plastics, glasses etc) from garbage heaps.	Cuts from glass/metals, exposure to harmful substances including waste from hospitals, inhaling stench from putrefied matter, infestation by flies, temptation to eat leftover food.	Cuts resulting in death from tetanus; chemical poisoning and risk of contracting infectious diseases; food poisoning.
Portering	Lifting and carrying heavy loads.	Risk of being slipped and injuries, bodily deformation, Protein Energy Malnutrition (PEM)	Hindered growth.
Small Restaurants & Bars	Dish washer, waiter and cook.	At the mercy of the employer; long hours of work; lack of sleep or rest; abuse of health and moral standards (sexual abuse).	Moral suppression, psychological trauma,
Domestic Service	All types of domestic work	At the mercy of the employer; long hours of	Moral suppression, psychological

		work; lack of sleep or rest; abuse of health and moral standards (demeaning work, sexual abuse); isolation from society.	trauma,
Overland Transportation	Fare collection, cleaning, repair & maintenance.	Risk of falling off, injuries, abuse of health and moral standards.	Respiratory diseases, chemical intoxication, injuries and even death
Carpet Factories	Wool spinning and thread rolling, wool dyeing, carpet weaving, washing, etc.	Inhalation of wool dust contaminated with fungal spores, poor (squatting) work posture, exposure to hazardous chemicals, etc.	Respiratory diseases, musculo-skeletal diseases (eye strain and defective vision at premature age), chemical intoxication, aggravation of non-occupational diseases, etc.
Brick & Tile Kilns	Clay making, brick moulding, brick transportation, etc.	Inhalation of dust, exposure to extreme cold and hot environments, heavy loads, etc.	Respiratory and cold related diseases, swelling of limbs, musculo-skeletal diseases
Match Factories	Mixing steaming chemicals and making matchsticks/ boxes.	Exposure to harmful chemicals, fire and explosions.	Chemical intoxication, burns, musculo-skeletal diseases, etc.
Leather Tannery	Handling chemicals and leathers with chemicals.	Exposure to harmful chemicals.	Chemical burning and intoxication, musculo-skeletal diseases, etc.
Stone Quarries	Stone quarrying, transportation and crushing.	Exposure to cold water for long, dust inhalation, injuries to eye, etc.	Respiratory and cold related diseases, swelling of limbs, musculo-skeletal diseases
Coal Mines	Coal quarrying, crushing and transportation.	Inhalation of coal dust and toxic gases, possible caving-in, etc.	Intoxication, injuries, death due to cave-in,

(Source: National Master Plan on Child Labour 2001-2010)