

Govt. Of India, New Delhi  
RNI No. MPBIL/2006/18581

# JOURNAL OF ENVIRONMENTAL RESEARCH AND DEVELOPMENT

AN INTERNATIONAL RESEARCH JOURNAL OF NATURAL SCS., TECHNOLOGY,  
SOCIAL SCS., LAW AND MANAGEMENT FOR ENVIRONMENT

[www.jerad.org](http://www.jerad.org)

ISSN 0973-6921

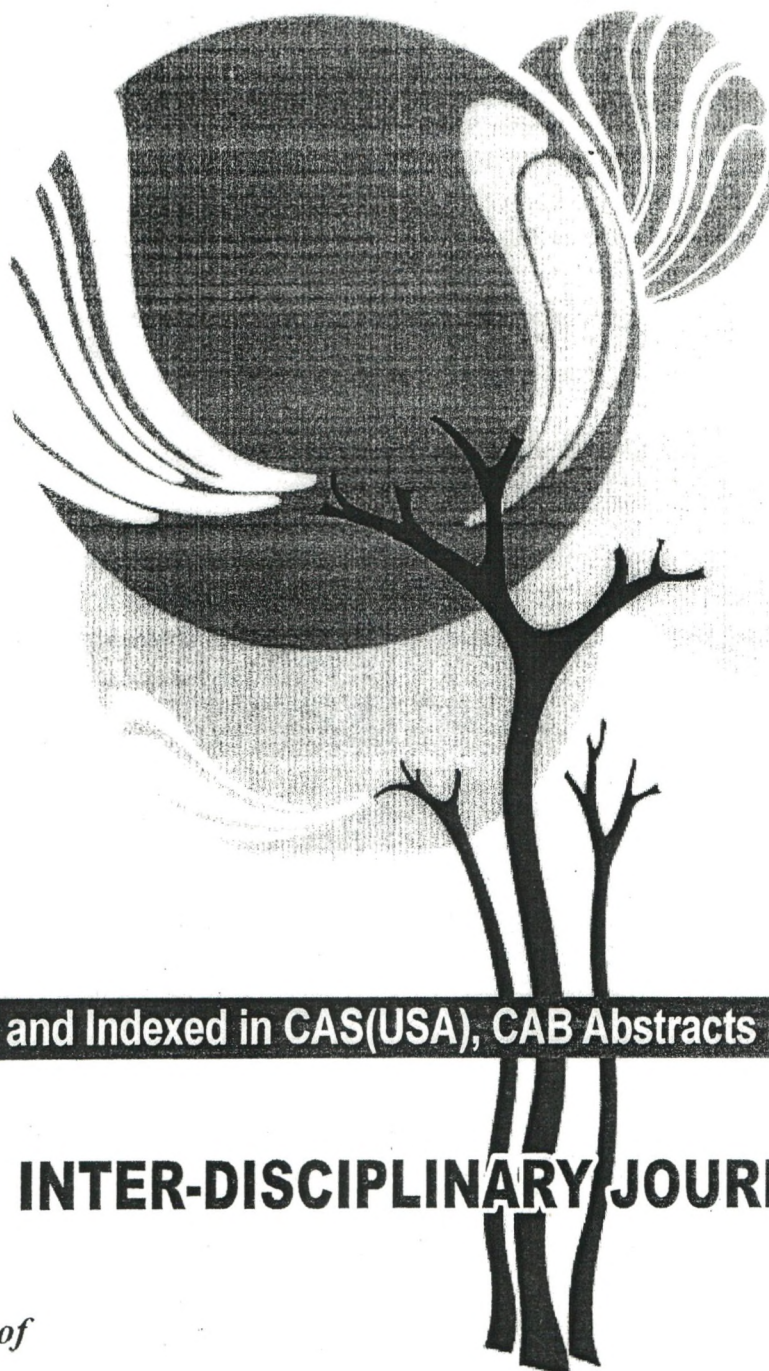
Volume -07

Number - 01A

Periodicity - Quarterly

July-September 2012

Impact Factor - 0.157



Abstracted and Indexed in CAS(USA), CAB Abstracts (UK) & ISA (INDIA)



## INTER-DISCIPLINARY JOURNAL

*Under aegis of*

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**Single Copy :** Individual ` 800/- (US\$ 50), Institutional ` 1,000/- (US\$ 100)

**Packaging and Postal Charges :** India : ` 125/-, Foreign : US\$ 30 (surface mail), US\$ 50 (Air mail)

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## UNSAFE WORK ENVIRONMENT IN GARMENT INDUSTRIES, TIRUPUR, INDIA

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*Received May 05, 2012*

*Accepted August 20, 2012*

### ABSTRACT

Garment industry is one of the most important strategic industries which constitute about 7% of total industrial production in the world and 8.3% of the total trade in industrial materials. Also, occupies more than 14% of the total labour force in the world. It employs about 40 million people in various countries of the world. Tirupur, located in Western Tamil Nadu, South India, is one of the largest knitwear garment manufacturing and exporting clusters in South Asia. It has boomed almost without interruption since the early 1970s when manufacturers began to export to Europe and today it is a leading centre of garment exports for the world market. Tirupur is also known as "T-shirt city", accounts for approximately 80% of India's total production of knitwear for export. The work environment in the garment industries is unhealthy and unsafe for the workers resulting in several health problems. Five hundred and fourteen workers employed in 13 large, medium and small scale garment industries in the present study the workers ere participated in a face-to-face confidential interview. The workers were exposed to an interview schedule comprising their details of socio economic background, personal habits, their knowledge, attitude, practice regarding occupational health, body parts that experience discomfort and other health problems. The aim of this study was to measure work environment parameters such as lighting, noise, temperature and humidity and also to assess the safety measures practiced in garment industries using a checklist. The study revealed that the congested work area, unergonomic workstations, poor illumination, improper ventilation, excessive noise, dust and use of personal protective equipments not in practise were the major problems faced by the workers in these industries.

**Key Words :** Garment industry, Workers, Work environment, Health problems, Checklist

### INTRODUCTION

A healthy and motivated workforce is the key ingredient for productivity and economic prosperity. Workers seek greater reward for their productive efforts through improved working conditions and a safer working environment. The expansion in scale of operations coupled with aging of mechanical installation and introduction of complicated and hazardous technologies is believed to raise health risks along with safety requirements for workers, resulting in high rates of accidents, occupational disease and unhealthy working environment.<sup>1</sup>

Lighting, noise, temperature and humidity are some of the important parameters which humans

exposed with regards to the environment in which they live and work. The effects of above environmental parameters have a direct effect on the production quality levels and physiological functioning capacity of human being. The human body capacity and the proper design of the equipment are effective only if the environment is congenial. It is therefore very important to study each and every environmental parameters ergonomically. It is important to provide comfortable environment along with to the worker when you design the job, design the equipment to do the job and while analysing analysis of human anthropometrics measurements.

Garment industry is one of the most important strategic industries which constitute about 7% of total industrial production in the world and 8.3%

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of the total trade in industrial materials. Also, occupies more than 14% of the total labour force in the world. It employs about 40 million people in various countries of the world.<sup>2</sup> The unhealthy and unsafe work environment in garment industries results in several health problems. Since, the workers are the driving forces of the national economy and thus their working lives should be protected from various occupational health hazards. Hence, the health and safety of the workers have been recognized as a fundamental human right. This paper highlights the unsafe work environment prevalent in garment industries.

### AIMS AND OBJECTIVES

The main objectives of the study were to :

1. Measure work environment parameters such as lighting, noise, temperature and humidity.
2. Assess the safety measures practiced in garment industries by using a checklist.
3. Detect unsafe environment in garment industries.

### METHODOLOGY

The present study was taken up in Tirupur which is the seventh largest city in Tamil Nadu, India and is one of the fastest developing city in the state. Popularly referred as Dollar city or small Japan or T-shirt city or Banian city it excels in knitted ready-made garments.<sup>3,4</sup> Thirteen garment industries of large, medium and small scale were selected randomly for the measurement of work environment parameters using concerned apparatus and assessment of safety measures practiced by garment workers.

The work environment includes all the parameters such as lighting, noise, temperature and humidity. Thus to assess the work environment all these parameters were studied in depth to arrive at valid conclusions. The illumination level was measured with a hand held digital lightmeter (TES 1332). All the readings were taken at the Point of Operation (POO). The activity areas were divided into approximate grid and for readings, an average value was obtained. An initial walk around survey was conducted to estimate the noise exposure level using precision sound level meter (TES 1350) set on the 'A' weighting scale. The microphone was placed in the employees hearing zone. Averages of a minimum of three observations were taken to ensure reliability of the recorded values. The room temperature and humidity levels were recorded simultaneously using a hand held digital thermohygro clock.

A checklist was prepared to identify hazards and safety measures practiced in garment industries. It was then administered to 514 garment workers in the same selected garment industries.

### RESULTS AND DISCUSSION

The details of work environment in garment industries are presented in **Table 1**. The lighting levels ranged from 176 – 918 lx with a mean of 410 lx. According to Gandotra et al.<sup>5</sup> the lighting between 500 lx and 1000 lx gives satisfaction to workers. The noise level ranged from 74 dBA to 102 dBA with a mean of 91.7 dBA. Regulations limiting noise exposures of industrial workers have been instituted in many countries. In Estonia, the

**Table 1 : Details of work environment of garment industries**

Parameters	Range	Mean
Lighting (lux)	176 – 918	410
Noise (dBA)	74 – 102	91.7
Temperature (°C)	28 – 37	34.8
Humidity (%)	25 – 59	44.5

current threshold level value for eight hour noise exposure is 85 dBA.<sup>6</sup> Hence in the present study, the noise level in the garment industries was found to be above the recommended levels. The temperature in the industries ranged from 28°C to 37°C with a mean of 34.8°C. This high temperature may be due to the climatic conditions. Workplace heat exposure, in addition to causing heat-related illness (such as heat stress, heat syncope, heat exhaustion, heat stroke, etc.) has been found to decrease productivity and to increase job - related accidents.<sup>7</sup> According to Reinhold and Tint<sup>8</sup>, the minimum permitted temperature in workrooms is 12°C (in cold season the mean temperature of ambient air is below 10°C), hard physical work (energy consumption exceeds 1050 kJ/h). The maximum permitted temperature is 28°C (in warm season the mean temperature of ambient air exceeds 10°C), light physical work (mainly performed in a sitting position, energy consumption is below 500 kJ/h). Humidity in the industries ranged from 25% to 59% with a mean of 44.5%. By the norms, the optimum humidity of the air is 40% to 60%, while permitted humidity is up to 70%. The humidity of the air may influence the health and comfort of the worker as too dry air can cause local irritation of mucosa, eyes and skin. The overall symptoms

are dizziness and headache. In the case of too humid air, the sensitiveness to the odours (gases, vapour) from the finishing materials will increase. Most workplaces have a number of different hazards, which can be divided into the following broad categories namely mechanical, physical, chemical, biological, ergonomic and psychosocial. These hazards are common to many occupations and workers are often exposed to more than one at a time. For example, it is not difficult to imagine a worker in a garment industry being in a hot, noisy environment and using an unguarded machine. With the worker feeling tired and losing concentration in such an environment, there is the potential for an accident if any guards are missing off the machines. Workers do not create hazards in many cases; the hazards are built into the workplace. It is essential that work is made safer and healthier by modifying the workplace and all unsafe work processes. **Table 2** represents the various hazards prevalent in Tirupur garment industries.

**Table 2** indicates that one fourth of the workers responded to mechanical hazards in their workplaces. Compared to large and export garment industries in Tirupur, medium and small industries face more difficulties. It is very common to see guards missing from machines or sometimes

**Table 2 : Hazards prevalent in garment industries**

Particulars	Frequency (N=514)	Percentage
Mechanical hazards	129	25.0
Physical hazards	178	34.6
Chemical hazards	60	11.6
Ergonomic hazards	347	67.5
Psychosocial hazards	168	32.6

because the machines are old and the guards have been escaped or were not present in the first place. Some industry managers indicate that they are replacing the machines in the near future.

Another most common findings is poor housekeeping i.e. untidiness, disorder and clutter not only reduces productivity by blocking the smooth flow of materials through the industry, it

often represents a fire hazard as boxes, thread, trimmings and other combustible materials are left everywhere. It also can encourage vermin and their associated health hazards. The accidental mechanical hazards include from cuts, bruises, wounds, sprains, fractures, loss of fingers and hands to even sometimes death. Often workers complain about the lack of space and overcrowding in the industry. For this reason, it is essential to make much better use of the available space through better housekeeping, storage, etc. Garment industries which have introduced regular cleaning programmes using industrial vacuum cleaners not only reduce maintenance costs as the machines remain cleaner for longer, there is less absenteeism through sickness and ultimately the factory has a competitive advantage through improved productivity.

Thirty five per cent of the garment workers agreed that they had to experience physical hazards such as noise, vibration, electricity, temperature and lighting in their working places. High noise levels are found in some parts of garment industries. For example, if the factory has associated weaving sheds, these machines are likely to produce noise levels well in excess of what is considered safe. Similarly, if many of the sewing machines are old or mounted incorrectly, they are likely to produce high noise levels. The health effects of noisy environment and presence of vibration are temporary and permanent hearing loss and vibration disease called vibration white finger. This condition results from persistent microscopic damage to nerves and tiny blood vessels in the hands and fingers as a result of long-term exposure to vibration.

Burns, electric shock or sometimes death may be possible due to frayed wiring, broken plug sockets and wires dangling close to workers in many parts of a garment industry. Due to danger of electrocution there is possibility of fire.

Many garment workers complained of hot, humid conditions in key sections of the garment industry such as ironing area. The other health effects reported were irritability, heat cramps, exhaustion and stroke (dehydration). As a result, some owners provided ad-hoc solutions by placing fans in certain locations to try to increase the ventilation.

A common problem found in many Tirupur

garment industries is either too much or too little light. In both cases, this can lead to a reduction in quality and productivity as workers either struggle to see their work or find the glare too much for their eyes. For example, it is recommended that workers undertaking fine work need adequate lighting (in the order of 1000 lux) but what they do not need is, for the bright light to be shining directly into their eyes. They need the light to shine directly onto the exact area where the fine work is being carried out. Often there are no shades on the lights or they are poorly positioned. In some cases, the shades may be present but the light reflects off a shiny surface and into the workers' eyes. For the industry as a whole, there must be good general lighting especially near steps, ramps, exits, etc. So that workers can see where they are going and avoid trips and falls. In the cases of fluorescent lighting, they are often flickering which can be extremely stressful to workers. Months of dust cover the lamps and the windows and there appears to be no regular cleaning or maintenance programme in place.

Causes of fire accidents in Tirupur garment industries may be due to unplanned work environment, disorganized workers, electric short circuit, faulty electrical wiring, smoking materials, boiler explosion, kitchen stove and carelessness, fire from existing structure and poor building design. More importantly, industry management were found to be totally unaware of the need and importance of the means of escape, the fire exit route to escape from the affected area to a place of safety or a place of refuge in case of fire. During survey, it is found that most of the garment industries have no designated first aid sections clearly marked. Hence, this section should be well stocked with medicines and bandage so that minor accidents in industry can be dealt with immediately. All the workers should be thus trained in basic first aid treatment and it is ensured to present in every shift especially at night.

Twelve per cent of the workers complained of chemical hazards. Almost all the occupations in industry have scope of exposure to some chemical substance or the other. These substances may be solids, liquids or gases, vapours, fumes, dusts, smoke, mist, fog or smog.

Hence, chemicals come in various forms and can

produce a variety of effects ranging from burns and allergies to poisoning and cancer. From the perspective of the garment industry, the main chemical problem come from the high dust levels in certain sections of the industry (e.g. the cutting section) and from the choice of chemicals used in the spot cleaning process.

Prolonged exposure to cotton dust, flax and soft hemp can lead to the chronic respiratory disease known as byssinosis characterized by wheezing, chest tightness and a shortage of breath amongst the affected workers (particularly noticeable after the weekend break and therefore called as Monday Fever). This is probably due to a histamine releasing substance. In addition to histamine release, exposure to cotton dust causes irritation in the upper respiratory tracts and bronchi, which after prolonged exposures slowly progresses to chronic obstructive pulmonary disease. Besides all garment industries have dust problems. Dust fibres mainly produced from cutting and sewing sections of garment industries can be seen on workbenches, lamps and even workers hair. The smallest of these fibres are breathed in by the workers and, over the long term, cause a variety of respiratory problems. The problems are made worse as many industries use brooms and dusters to clean the workplace rather than use of industrial vacuum cleaners which simply spreads the dust and dust control is often made worse as workers do not wear their dust masks in the correct fashion.

Other chemical problems relate to the use of various spot cleaning agents in the garment industry. Whilst some industries are switching to the safer option of using soap or water mixtures for the cleaning process, others are using various solvents which can have serious health and safety problems if not used in the correct manner. Workers and owners often have little awareness of the dangers of such chemicals as they are not provided with the requisite Material Safety Data Sheet (MSDS) by the manufacturers.

Sixty seven per cent of the workers reported to have ergonomical problems. Such problems are common throughout the garment industry. Obsolete machinery, inadequate seating and standing arrangements for workers and the improper lifting or movement of heavy loads all

lead to stresses and strains on the body. Due to awkward postures adopted by workers while working end up in Work related Musculoskeletal Disorders (MSDs), lower back problems and fatigue. Common MSDs are Tendonitis, Epicondylitis (Tennis or Golfer's Elbow), bursitis, trigger finger, carpal tunnel syndrome and back strain. Work - related MSDs are also known as Repetitive Strain or Stress Injury (RSI), Repetitive Motion Injury (RMI), Cumulative Trauma Disorder (CTD), Overuse Syndrome or activity-related pain syndrome.

Thirty three per cent of the workers of garment industries felt psychosocial hazards. Factors responsible for psychosocial illness are frustration due to type of work, risks involved in work, monotony, long working hours, lack of recognition, lack of job satisfaction, poor man/woman management, lack of welfare activities and tensions at home and place of work. Work-related stress is not an illness but it can lead to physical effects such as heart disease and gastrointestinal disturbances leading to ulcers and psychological effects such as anxiety and depression. The indicators for psychosocial group are chronic absenteeism, mass leave, lock outs, strikes and unexplained reduction in production.

The results of a study conducted by Akhter et al.<sup>9,10</sup> on "Health and Occupational Safety for Female Workforce of Garment Industries in Bangladesh" was on par with the results of the present study. It was found that very few garment industries had legal requirement of proper cleanliness, disposal of wastes and effluents, ventilation and temperature, dust and fumes, artificial humidification, lighting, drinking water, latrines and urinals, spittoons and but prevalence of overcrowding, sexual harassment, discrimination in wage fixation, not enough maternity leave, no baby care center, etc.

A study conducted by Lu<sup>11</sup> on occupational hazards and illnesses of filipino women workers in export processing zones is in agreement with the present study. The study evaluated physical, chemical and ergonomic hazard. The 500 respondents reported five hazards namely ergonomic hazards (72.2%), heat (66.6%), overwork (66.6%), poor ventilation (54.8%) and chemical exposure (50.8%). The most common

illnesses were gastrointestinal problems (57.4%), backache (56%), headache (53.2%) and fatigue/weakness (53.2%) respectively.

Gomes et al.<sup>12</sup> carried out a study on The health of the workers in a rapidly developing country : effect of occupational exposure to noise and heat. Exposure to noise and heat were assessed at a foundry. Audiometry, muscle cramps and visual acuity were measured in workers at a foundry and compared with the results from workers at a soft-drink bottling plant. Thermal stress, relative humidity, ventilation, illumination and noise levels were measured at different work units at the foundry and at the soft-drink bottling factory. Thermal stress index was high while relative humidity and ventilation were low at the foundry compared with the bottling plant. Noise levels were also high at the foundry, exceeding 90 dBA at almost all work units except the fabrication workshop. Mild or moderate visual defects were observed among 31% of foundry workers, compared with 19% of the bottling plant workers. Muscle cramps were reported by 30% of all workers at the foundry compared with 5% at the bottling plant. Visual disability was the highest among furnace operators and fabricators.

Occupational exposures to heat and noise are unavoidable in the garment industries, but these exposures could be minimized through efficient control measures at the worksite and/or the proper use of appropriate personal protective equipment and exposure to control measures are rarely used at many worksites and are given little importance and preference by many employers. This neglect may be due to the fact that the workers in rapidly developing countries are economic migrants from other states of the country, who accept occupational exposures as part of the job. The hot and humid climatic conditions further dissuade the workers from using personal protective equipment, even when provided.

Medical surveillance is a valuable tool for assuring and maintaining a healthy workplace environment. It is the periodic testing of employees exposed to potentially hazardous materials or other risks in the workplace. It helps thus to detect early signs of work-related illness so that appropriate action can be taken to eliminate the underlying exposures.

## CONCLUSION

The medium and small sized garment industries in Tirupur were found to have poor illumination, improper ventilation, excessive noise, congested work area, unergonomic workstations. The workers were exposed to dust, chemicals mainly in the form of solvents, ergonomical problems, psychosocial problems, etc. Due to lack of education, unawareness of the hazards of their occupations, general backwardness in sanitation, poor nutrition and climatic proneness of this geographic region to epidemics aggravates their health hazards from work environment. Hence, measures towards improving the awareness of occupational health and safety and thereby motivating the workers in use of personal protective equipments would help in achieving a safe and healthy workplace environment.

## ACKNOWLEDGEMENT

Authors acknowledge the cooperation and help extended by the Tirupur garment industry, India, management and workers in conducting personal interviews, measuring workplace environment parameters at each section very thoroughly.

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*Printed and Published by Dr. Sunil Kumar Pandey for Global earth Society for Environmental Energy and Development, A-6, Comfort Garden, Janki Nagar, Chuna Bhatti, Bhopal-462016 (India)  
Printed at : Anurag Offset, 26B Press Complex, M.P. Nagar, Zone-I, Bhopal--462011 (India)*

*Editor : Professor Subhash C. Pandey*

