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ASSESSMENT OF WORKING ENVIRONMENT IN READY-MADE GARMENT INDUSTRIES: A CASE STUDY IN GAZIPUR, BANGLADESH

Mahmuda Binte Latif[1*], Razia Sultana[1], Jannatul Ferdouse[1], Nowara Tamanna Meghla[1], Muliadi[2], and Shamim Al Mamun[1]

[1]Department of Environmental Science and Resource Management, MawlanaBhashani Science and Technology University, Tangail-1902, Bangladesh
[2]Department of Chemistry, Universitas Khairun, Ternate, Indonesia
**Corresponding author: mahmudambstu@gmail.com*

ABSTRACT

The study was conducted to assess the ambient environmental condition (temperature, humidity, noise and illumination) in the SIJI Garments Co. Ltd., Ehsan Garments Ltd. and Silver Composite Textile Mills Ltd. in Gazipur District, Bangladesh from September, 2016 to February, 2017 (during winter season) to know the internal working environment of the garment industries. In the SIJI Garments Co. Ltd., the highest temperature was observed in the cutting section (28.7°C), sewing section (28.9°C) and packaging section (29.2°C) which exceeded the guideline values. The highest noise level was observed in packaging section (86.6 dB). The illumination level in the most densely populated sections of workers such as cutting section (450 lux), sewing section (490 lux) and sample section (488 lux) were found unpleasant for the workers. In Ehsan Garments Ltd., the highest temperature was observed in sewing section (26.4°C) which exceeded the ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers)standard and the noise level in sewing section (88.4) which exceeded the ECR guidelines. In Silver Composite Textile Mills Ltd. the illumination level was poor in almost all sections specially cutting (466 lux), sewing (565 lux) and finishing (515 lux) sections where maximum number of workforce was employed. The temperature of all sections of three readymade garment industries were optimum to moderately high, humidity level was around optimum level but the noise levels highly exceeded the ECR, 1997. The illumination level was insufficient especially in the cutting and sewing section.The study revealed that congested work area, improper ventilation, building design, excessive noise, poor illumination, dust and no use of personal protective equipment were the major problem faced by the workers in these industries.

Keywords: Garment industry, environment, temperature, humidity, noise and illumination.

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1. INTRODUCTION

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 [1]. The export oriented readymade garment industry (RMG) of Bangladesh started in 1977 by the Reaz and Jewel garment and Desh Company [2] as a small non-traditional sector of export. Bangladesh's thriving RMG industry has grown from USD 12,000 in exports in 1978 to USD 21.5 billion in 2012-13, and now accounts for about 78% of country's total export-earning. The industry has created a platform for 2.8 million womento engage in new productive role in the society and empowering them. Around 20 million people are directly and indirectly depending on this sector for their

immediate livelihoods[3]. The environmental factors (i.e. air temperature, humidity, air movement and radiant temperature) which determine the indoor thermal conditions are of primary importance for the performance of human activities, and maintenance of health and well-being [4].

The Garment industry comprises of several functional divisions such as cutting, sampling, sewing, inspection, dyeing, ironing, spot removing, packaging, etc. The work environment in the garment industry plays a vital role in increasing the productivity and well-being of the workers. Temperature, noise and lighting are some of the important parameters those have a great influence on the health, comfort and performance of the workers [5].The sound of machines is the main source of noise in the RMG sector which is unpleasant to the workers sometimes but they are obliged to work in that situation and suffer from health related problems [6].Relative humidity is negatively related to the temperature [7]. Adequate lighting reflects healthy environment for the workers that ensuring increase of quality production. Poor lighting at work place can cause eye strain, fatigue, stress, headaches and accidents to the workers [8].

In Bangladesh, the industrial areas are situated in the middle part of densely populated regions. The growth of industries has generally been done in an unplanned way without considering the issue of environmental protection.Gazipur district is one where rapid, unplanned industrial expansion has led to various problems.Due to the unsafe working condition in the industries the workers have to face many diseases like heat stroke, eyestrain, fatigue, stress, headache, hearing impairment etc. A proper working environment is important not only from the standpoint of increasing productivity and improving the physical health and safety of the workers, but also for promoting workers morale,consequent reductions in worker absenteeism and workers turn-over. On the other hand, many of them have no regular practice of assessing environmental parameters. Keeping all these views in mind an experiment was conducted to measure thetemperature, humidity, noise and illumination of three readymade garment industries in Gazipur district to know their present condition inside the industries, find out most vulnerable areasof the working places and impacts on worker's health risk and general health safety of the workers in the above mentioned industries.

2. MATERIAL AND METHOD

The study was carried out during the period of September, 2016 to February, 2017 to arrive at valid conclusions about the working environment of three selected industries that were picked as representative of RMG sector. We visited each studied industry for several time. Most of the samples were collected from the selected industries (The SIJI Garments Co. Ltd., Ehsan Garments Ltd., and Silver Composite Textile Mills Ltd.) of Gazipur district at during the working period (8 am -5 pm) and the measurement of time interval was adjusted for 15 minutes each time on each work section.The temperature and humidity levels were recorded simultaneously. Temperature and humidity level were measured in °C and percentage, respectively by anemometer (Model: AH-4223). The measurement of industrial noise was carried out in the selected study areas. The chosen locations represent those sections of the industrial

work place where maximum numbers of workers are employed. To estimate the noise exposure level, the noise levels were measured with the help of a portable digital sound level meter (Model: SI-4010, Ade in Taiwan). The illumination levels were measured with hand held digital light meter (Model: LX-101A). All the readings were taken at the point of operation. Averages of a minimum of three observations were taken to ensure the reliability of the recorded values.

3. RESULT AND DISCUSSION

Most of the working sections in the SIJI Garments Co. Ltd, Ehsan Garments Ltd., and theSilver Composite Textile Mills Ltd are sample section, cutting section, sewing section, finishing section, packing section, iron section, embroidery section.

Temperature

The highest temperature was observed in iron section in the SIJI Garments Co. Ltd. and the Silver Composite Textile Mills Ltd. which exceeded the comparative temperature standard according to ASHRAE [9] standard in which in summer the acceptable operating temperature is 23-28°C and in winter the temperature is 20-24°C. The average temperature of cutting section and iron section were higher than the other sections. In Ehsan Garments Ltd. the highest temperature was observedin sewing section which also exceeded the ASHRAE standard.The average temperature of sewing section and finishing sectionwere comparatively higher than the other sections.Among the three industries, the highest temperature was observed in the Ehsan Garments Ltd. in sewing section (28.9°C) and the lowest temperature was observed in the Silver Composite Textile Mills Ltd. in packaging area (24.3°C). [10] reported that the temperature level of Comfit Composite Knit Ltd. in sewing section, cutting section and finishing section were 27.10 °C, 27.63°C and 27.10°C and in South East Textile Ltd. were 29.90°C, 30.40°C and 30.10°C respectively. High temperature in working environment can cause many health effects to the workers such as headache, fatigue, nausea, loss of appetite etc.

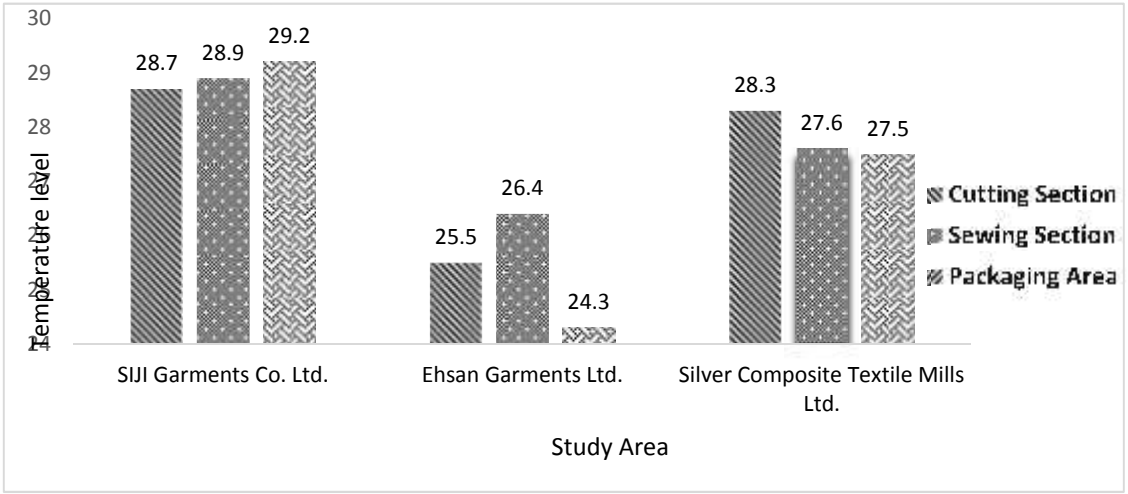

Figure 1. Average temperature in three selected industries.

Humidity

The most observable humidity levels in SIJI Garments Co. Ltd., Ehsan Garments Ltd. and Silver Composite Textile Mills Ltd. were58 to 69.2%, 50.8 to 56.2% and 48.1 to 51.4% respectively. According to ASHRAE standard, the humidity level should be 30 to 60%. In SIJI Garments Co. Ltd., the humidity levels of cutting, sewing, iron, packaging section were within the range of 30-60% of ASHRAE standard [9], however, the humidity level of sample section, spot removing area were exceeded the standard. The humidity levels of all sections were within the range of 30-60% of ASHRAE standard. The lowest humidity (48.1%) was observed in packaging section because this section is comparatively low densely workers area.

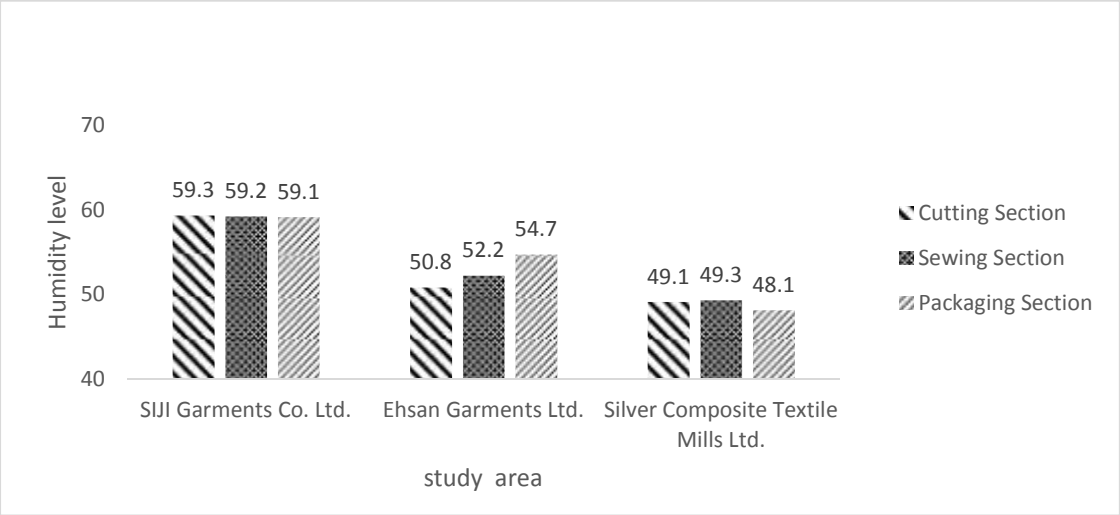

Figure 2. Average humidity levels among three selected industries

Noise

Among the three industries (SIJI Garments Co. Ltd., Ehsan Garments Ltd.and Silver Composite Textile Mills Ltd.), the highest noise level was found in theEhsan GarmentsLtd. in sewing section (88.4dB) which exceeds the ECR 1997 standard (75 dB).This can lead to headache, temporary and permanent

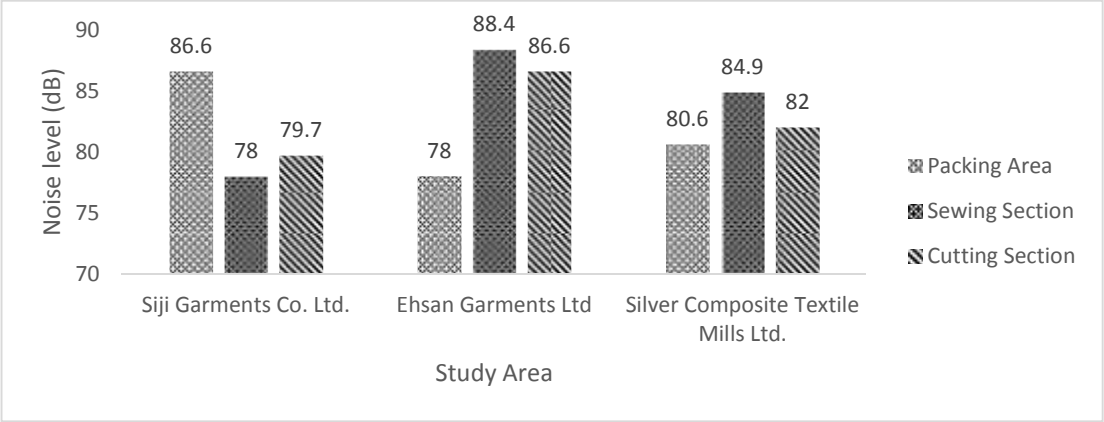

Figure 3. Average noise levels among three selected industries.

hearing loss. The average noise levels were comparatively lower in Silver Composite Textile Mills Ltd. than the other two industries.The average noise level of cutting section, sewing section, and embroidery section were higher in comparison to [12] noise level standard where ear muffs should be provided to the related workers. Among three industries, the lowest noise level was observed in the

300 lux in light illumination condition, 450 lux in medium illumination and 700 in dark illumination condition. The illumination level in the most densely populated sections of workers such as cutting section, sewing section, finishing section were found not satisfactory for the workers.In case of Silver Composite Textile Mills Ltd., the illumination level ranged from 410 to 570 lux. The

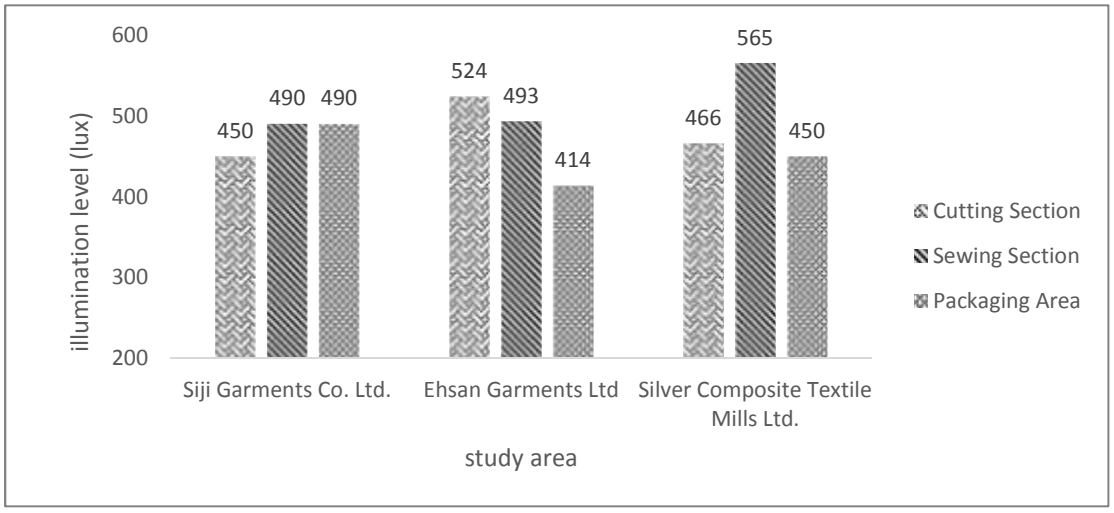

Figure 4. Average illumination level among the three industries.

Ehsan Garments Ltd. in packing section and in the SIJI Garments Co. Ltd. in sewing section which were also exceeded the ECR 1997 standard (75 dB). [10] found that the noise level in sewing section, cutting section and finishing section of the Comfit Composite Knit Ltd. were 52.10dB, 60.86dB and 52.10dB and South East Textile Ltd. were 63.16dB, 52.83dB and 51.66dB respectively.

Illumination

In the SIJI Garments Co. Ltd., the illumination level ranged from 450 to 490 lux.In the Ehsan Garments Ltd. minimum and maximum illumination levels were found 302 and 524 lux. According to [11] standard, the illumination level should be

illumination level in cutting section, sewing section and finishing section were unfavorable where maximum number of workforce was employed.The illumination level was too low in Ehsan Garments Ltd.compare to others. Insufficient lighting at workplace has negative effect on human health and affects the production process and product quality.This can lead to eye strain, stress, fatigue, headaches, and accidents. [10] stated that the illumination levels in sewing section, cutting section and finishing section of Comfit Composite Knit Ltd. were 430lux, 310lux, and 385 lux and in South East Textile Ltd. were 450lux, 284lux, and 360lux respectively.

Table 1. The temperature, humidity, noise and illumination level of other sections of three selected garment industries.

Study area		Temperature level (°C)	Humidity level (%)	Noise level (dB)	Illumination level (lux)
SIJI Garments Co. Ltd.	Iron Section	31.1	58	83.6	472
	Sample Section	28.8	61.4	79.6	488
	Spot Removing Area	28.8	69.2	79.7	450
Ehsan Garments Ltd.	Embroidery Section	24.2	54.1	83.3	416
	Finishing Section	26.3	53.2	81.7	474
	Spot Removing Room	23.5	56.2	79.7	302
Silver Composite Textile Mills Ltd.	Sample Section	26.7	50.3	75.5	570
	Finishing Section	27.7	50.1	81.7	515
	Embroidery Section	27.8	50.9	83.3	410

Among the three industries the highest temperature was observed in iron section of the SIJI Garments Co. Ltd. and the lowest temperature was observed in spot removing room. The highest humidity was observed in the SIJI Garments Co. Ltd. in spot removing room and the lowest humidity was observed in the Silver Composite Textile Mills Ltd. in finishing section which was within the ASHRAE standard [9]. The highest noise level was in the SIJI Garments Co. Ltd.in iron section (83.6 dB) and the lowest noise level (79.6 dB) was observed in sample sectionin the Silver Composite Textile Mills Ltd. which exceeded the [12] Standard. The highest illumination level was observed in sample section in the Silver Composite Textile Mills Ltd. and the lowest illumination level was observed in spot removing room in the Ehsan Garments Ltd. which were comparatively low (Table 1).

4. CONCLUSION

The economic condition of Bangladesh is developing but rapid industrialization is carrying out adverse effect on the environment as well as on the workers. The illumination levels were unfavorable in cutting section, sewing section, and finishing section where maximum numbers of workforce employed in three studied industries. The temperature levels of almost all the sections of the industries were optimum to moderately high, humidity level was around optimum level. But the noise levels exceeded [12] standard and excessively high. The study manifested that the major problems faced by the workers in these industries were improper ventilation, poor illumination, excessive noise and congested workplace.

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