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Impact of Heat, Noise, Dust, and Chemical Handling on Workers' Health in Sweater Garment Industries

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Abstract: Bangladesh earns the second-highest revenue from the RMG sector, which is the backbone of the national economy, with sweater manufacturing comprising a large share of labour and production. A mixed-methods approach, the research combines quantitative data from 450 workers across 15 factories in both Dhaka and Chattogram with qualitative insights from factory management and local stakeholders. The research reported that bad OHS practices long working hours, high concentrations of air pollution, high noise and heat levels. Even among workers reporting "good" health, respiratory symptoms and allergies were common and can be attributed to dust and textile particles. Worsening the above was exposure to extreme heat within the factory (with temperatures exceeding 40°C, Stronger enforcement of labor laws, more consistent health monitoring, and better safety practices at workplaces are the solutions the study suggests. The consequences of weaker safety cultures and inadequate policy implementation, demonstrating the urgent need to strengthen both to protect the health of workers.

Keywords: Occupational health and safety, sweater factories, heat, noise, dust, chemical, industrial safety.

INTRODUCTION

Bangladesh's garment industry has played a major role in the country's economic growth since it took off in the late 1970s and the early 1980s. The industry expanded largely because of cheap labor, a large labor force and favourable trade deals providing access to key international markets, especially the EU and the US. Bangladesh has emerged as one of the fastest-growing economies in the world, having a GDP of over USD 317 billion as of 2020 (World Bank, 2020). The ready-made garment (RMG) sector is the largest driver of this economic growth, providing jobs to over 4.22 million workers and accounting for $34 billion in exports in 2019 (Export Promotion Bureau, 2020). Bangladesh is the second-largest garment-exporting nation in the world, after China.

Even with these milestones, some aspects of the garment industry in Bangladesh are still in need of improvement, especially when it comes to worker health and safety. The industry is known for its slave-working conditions and it has gained particular notoriety over tragedies like the Rana Plaza collapse in 2013 killing 1,134 people and the Tazreen Fashions fire in 2012 which injured over 100 workers. Although substantial progress has been achieved on structural and fire safety, workers health issue remains sub-standard.

There is still very little exploration of the health risks due to garment production in Bangladeshi workers exposed to environmental hazards such as heat, noise, dust and chemicals. Due to these processes being long and heavy in sweater production, workers are specifically at a risk of many health problems. Poor ventilation, high noise levels, long working hours, and exposure to toxic chemicals lead to musculoskeletal disorders, respiratory diseases, and fatigue among workers. However, despite the fact that there is an emerging body of literature that describes generalized garment sector health problems, there is little research about health in sweater factories emphasizing that this is a research gap that needs to be addressed.

Examining health issues of workers associated with environmental factors like heat, noise, dust, and chemicals among sweater manufacturers in Bangladesh: a cross-sectional study Background The main objective of this study is to investigate health problems due to exposure to environmental factors; heat, noise, dust, and chemical among sweater manufacturers of Bangladesh. The specific goals include:

- A common health issues of sweater factory works.
- Contribution of heat, noise, dust, and chemicals to health impairment of workers
- Examining precautionary measures that can be taken by factory management in this respect to manage these risks and safeguard the health of workers.

The objectives of the analysis are to make sense of the key research questions, which are as follows:

- What are some common health problems faced by workers in the sweater production sector as a result of environmental stressors?

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- How do working conditions such as heat, noise, dust, and chemicals impact the physical and mental health of sweater factory workers?
- How can factory management mitigate health risks and make working conditions more pleasant for garment workers?

There are several reasons why this study is important. First, it sheds light on the little researched health threats of Bangladeshi sweater factory workers. This research will shed light on the environmental factors that lead to unhealthy and unproductive workers in the garment sector such as heat, noise, dust, and chemicals. It will also explore what the managers in the factory can do about these threats and risks to health and safety and how well these processes may be avoided. The results will also help policymakers and stakeholders to realise why they need to strengthen health and safety regulations in the apparel sector that can have general implications for other industries worldwide.

In this research, we are particularly looking at the sweater production sector of Bangladesh where workers directly face environmental hazards such as heat, noise, dust and chemicals in the factory setting. The study will be carried out in a handful of factories to measure health threats and check how effective the current safety procedures are. Its remit is constrained to factories only, and it does not capture other parts of the apparel supply chain, such as textile production or retail.

Furthermore, the research will not engage more extensive discussions on broader socioeconomic challenges of the garment industry or broader industry-wide structural reforms. The results will rely on the data collected from the Bangladeshi factory workers and management, which may not reflect the condition of other places or garment sector.

We hope that this study will contribute to a better understanding of some of the health challenges faced by workers in the Bangladesh sweater industry an area where there has been little research conducted to date. This research is aimed at increasing health and productivity of garment workers by identifying and probing effective changes in environmental factors in the factories contributing to poor health. The results will be useful for those working in the industry, advocates, and policy-makers who oversee the health of the workforce in the Bangladeshi garment sector where higher worker health and safety leads to a healthier and more sustainable workforce here.

LITERATURE REVIEW

Garment workers often face a number of environmental issues that can impact their health, safety and overall well being as part of the manufacturing and textile process. Work environment can become intolerable and unsafe because of Exposure to chemicals, Air pollution, Water pollution, Poor ventilation, Extreme temperature, Noise & Exposure to hazardous materials. The International Labour Organisation (ILO) states that over 25,500 Bangladeshi workforce die of work related diseases every year, about 11,000 people die due to workplace accidents and over 8 million people get work related tools in all sectors. (Alam et al., 2020). The warm weather is a worldwide problem today, and also the increasing ambient temperature of the world is a terrifying reality for all nature. By definition, heat waves are "prolonged periods of excessive ambient-related heat stress that disrupt local lifestyle and may have adverse health consequences for a population. As many as 70,000 people lost their lives due to this heat wave. (Chan and Yi, 2016). Workers might take off their personal protective equipment (PPE) due to heat related discomfort, which makes them extremely vulnerable to danger and injury." (Chan and Yi, 2016). Long-term noise exposure to 85 and 90 dBA, especially in an industrial noise environment, can result in an induced gradual shift in the threshold of hearing sensitivity in humans of a permanent nature, known as hearing loss." (Stansfeld and Matheson, 2003). Field noise levels values at all the workplaces investigated were above the noise pollution standard of DoE (75 dB during day time and 70 dB during night time). (Alam et al., 2016).

Byssinosis, also known as brown lung disease, is a chronic condition associated with exposure to cotton dust in textile workers. This condition also shows symptoms such as chest tightness, coughing, wheezing, and shortness of breath. (Talapatra and Rahman, 2016). The textile industry employs a wide range of colours, the most commonly used being azo dyes, which are aromatic hydrocarbon derivatives of benzene, toluene, naphthalene, phenol, and aniline. The carcinogenic effect of the solvents utilized by employees in the different sectors, when they interact with the subjects is significant. (Singh and Chadha, 2016). The Swedish Chemical Agency

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estimated that no less than 10,000 chemicals, with approximately 3,000 for routine use, may be used in dyeing and printing processes alone." (Chowdhury, 2014). The global textile industry accounts for approximately 25% of the chemicals produced worldwide according to another study. global scale as "industry is widely believed to dump 300-500 million tons of heavy metals, solvents, toxic sludge and other waste into waters each year." (Chowdhury, 2014). Most musculoskeletal disorder affected employees (55%). Neurological problems following that: headache (40%), respiratory issues (30%), skin issues (13%), numbness in the hands and fingers (8%), hearing (5%) and with discomfort from the eyes (2%).

The BGMEA started the early 1980s with just 12 members; today the BGMEA has nearly 4500 member manufacturers. This sector increases the GDP by leaps and bounds and creates almost 4.2 million new job opportunities. (Anon, 2015) & (Anon, n.d.)

The International Labour Organisation (ILO) is the main international organization that creates global standards governing workers' rights and workplace safety. Governments must enforce labour laws, regulations, and safety standards in order to protect employees' rights and minimize risks associated with occupational exposure. Also, employers have a responsibility to ensure safe working conditions, provide necessary training and implement safety measures. WHO (1947) Health: a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity. The Occupational Safety and Health Administration (OSHA) have regulatory limits set for noise exposure in the workplace, based on an 8-hour time-weighted average TWA for a worker. The 8-hour shift limit for OSHA is 90 decibels, A-weighted (dBA) as a permissible exposure limit (PEL). In comparison, a more protective exposure limit of 85 dBA for the same amount of time is recommended by the National Institute for Occupational Safety and Health (NIOSH). OSHA has a 5 dB exchange rate, which means that a 5-dB increase in the noise level halves the allowable exposure time. Conversely, NIOSH advises a 3-dB exchange rate, which means for every increase in noise level of 3 dB, the permissible duration of exposure should be halved. The best workplaces are those that are designed by the best ergonomics, safety, and occupational health principles: the most resilient and productive workplaces." (Ahmed et al., 2020). A number of solutions were produced and rated using the QFD technique, with a "correct arrangement" classified as the optimal solution, combined with the establishment of sanitary dining facilities." (Ahmed et al., 2019)

Many of the earlier publication's info excluded diverse places with different wellness issues created by different ecological issues. Absence of Sweater Garment Specific Studies most current studies about the occupational health risks has been based on broader manufacturing industries where potential hazards employed during the garment production are not provided and this lack of environmental factors present during the sweater manufacturing. "While researchers have studied effect of heat, noise and dust, and exposure to chemicals, by and large the combined exposure to such hazards along the production line has not been thoroughly investigated. Regional Variance in Impact the impact of these occupational hazards may vary on a regional basis since the technological and machinery advancement, proper ventilation system and adherence to the safety norms may differ from one geographical area to another. The potential psychological and long-term health effects of these hazards, such as stress, anxiety, or chronic illnesses, are not so much of a concern. Worker-Centered Research deficiency many studies on occupational health looks at the technical side, (e.g., levels of exposure to chemicals or noise), but emphasis is often lacking on the experiences of workers. In many areas, workers are underreporting health issues because of fear around losing their jobs because of health, or ignorance of the risk to health at work. "Identifying Health, Safety and Environmental Risk Factors in Garments Industries of Bangladesh (Ahmed et al., 2019). It addresses the risk factors which burden the employees but does not mention the health issues that burden them. Absence of a quantitative justification of the problems of workers may limit the reliability and accuracy of the assessment of the occupational risk factors. Of course, the fact that only 15 garments have been tried doesn't really prove much about the industry as a whole, but it might be closer to reality than we think.

We aimed to do this in this study in order to gain knowledge about the various health issues. The study attempts to reveal the actual effects that it is exerting on the garments industries of Bangladesh and, we will get data from the workers through interviewing them and, also through the questionnaire method. This information will help me learn from the staff who works permanent

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garments. We will focus on the noisiness-related places of the clothes, hot spots, dusty places and places in which chemicals are handled for the clothes. Our main objective is gathering data which supports changing the employee rate. Step one: Primary Data were collected through survey responses of questionnaire based from RMG sweater employees. that is secondary data collected through journals, books, periodicals and newspapers etc. Key Issues covered by the study are heat, noise, dust, and chemical affecting the workers of the garment sector. We therefore hope that our research will make a significant contribution to raising awareness to health and safety of workers. "Hence the importance of looking after the health of garment workers in enhancing economic growth and labour stability nationally is realised."

METHODOLOGY

A mixed-methods design that included both quantitative and qualitative approaches was used in this study. This combined method provided insights into the impact of workplace conditions on different workers at different stages of sweater production. PSPP statistical analysis program was used to analyze data from questions and interviews.

According to industry directories in October 2023, of the 4,841 garment factories in Bangladesh, 3,212 were export-oriented factories. Among them, 534 factories were involved in sweater production, with just over 332,617 workers employed; the approximate average number of workers per sweater factory was around 623 (Anon, n.d.). Due to the nature of the analysis, the research focused solely on export-oriented sweater factories, in line with the objectives of the study and availability and reliability of worker-specific data.

Study Design and Sampling

Study area the garment sectors in Bangladesh primarily pack within four major industrial zones of Dhaka and Chattogram divisions. Gazipur, Savar, Narayanganj and Chattogram, which were selected as the study area because of the high density of export-oriented sweater factories. To capture the diversity of operational contexts, we employed a cluster-based probabilistic sampling strategy. Factories are taken from these zones and with the selection of at least simple random sampling 30 workers from each factory the study consisted of 15 factories. The respondents were selected from operational departments, which comprise warehouse, winding, knitting, linking, washing, sewing, ironing, quality control, packing, boiler and generator operations. The aim was to build a holistic overview of working conditions throughout the various stages of the sweater production process.

Based on a 95% confidence level and a 5% margin of error, the study calculated a minimum sample size of 384 respondents. A total of 450 workers (15 factories × ≥30 workers) were reached, which is higher than the minimum required sample size.

A structured, closed-ended questionnaire addressed to workers was the main quantitative tool. Qualitative data were also collected, including focus group discussions, in-depth interviews and ethnographic observations to explore the experiences, perspectives, and social contexts regarding garment worker health. More news linked to the study was accomplished by interviews with the resident of the factory and local people, and literature data, search and from textbooks, and so-called trustworthy websites; journals written in by global report journals.

Data Collection

The data collection conducted on site in factories located at Gazipur, Savar, Narayanganj, and Chattogram. All data were tracked in the period between April 2024 and March 2025. Methodology Quantitative data collection comprised of surveys and questionnaires to provide a comprehensive understanding of garment worker health, to estimate prevalence of health conditions, to investigate information on associations between workplace exposures and health outcomes, and to identify key risk factors. We used standardized questions to adequate statistical power and the ability to replicate nationwide assessments. To supplement and place the quantitative findings within the context, we conducted three sources of qualitative data: focus groups, in-depth interviews, and ethnographic observations.

Quantitative analysis and qualitative analysis were conducted. Data from questionnaires and interviews were analyzed using the PSPP program of statistical analysis. For quantitative analyses this took the form of descriptive summaries of critical indicators (e.g., prevalence estimates) and an assessment of relationships between workplace exposures and health outcomes congruent with the aims of the study. Qualitative data from focus groups, interviews, and ethnographic observations

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complemented interpretation of quantitative results and provided context to factory sections and zones.

Ethics Satement

All procedures were in accordance with institutional and national research ethics standards. All participants were informed about the study, its purposes and procedures, possible risks and benefits, their right to voluntary participation, and the right to refuse participation or to withdraw at any time without penalty and were asked to sign the informed consent before the beginning of the study. No personally identifying information was included in the analytic dataset and data were stored securely with access limited to the research team to preserve participants' anonymity and confidentiality. They were then given factory-level permissions, without enabling management to affect worker participation or responses. To protect privacy and mitigate any potential social or managerial pressure, interviews and discussions were held at a time and place that worked for each individual rather than at a group meeting. Reporting is done in the aggregate, so that no individual, or individual factory, is identified.

The results highlighted average employee distribution and working conditions according to the type of workstation environment. The results were packaged for dissemination with stakeholders working on occupational health and safety in the garment sector, and to inform future workplace health and safety interventions. Research was designed to be practical, producing recommendations for factory management with the goal of enforcement of prevention-based health and safety practices that strengthen safe materials processes.

RESULTS

As illustrated in table 1, the study sample consisted of 450 respondents. indicates that 66.0% (n = 297) were male and 34.0% (n = 153) were female.

Table 1*:* Gender Distribution of the Sample

Gender

		Frequency	Percent	Valid Percent-	Cumulative Percent
Valid	Male	297	66.0%	66.0%	66.0%
	Female	153	34.0%	34.0%	100.0%
Total		450	100.0%		

According to Table 2, the largest shares of workers are in Linking/Trimming/Mending and Knitting. Specifically, the share of workers in Linking/Trimming/Mending is 32.4 percent, n = 146 and those in Knitting is 20.7 percent, n = 93. Other sections are Quality Control , Packing, Ironing, Sewing, and Winding. Finally, the lowest shares are in Washing , Boiler.vironment and Generator.

Table 2: Frequency and Percentage Distribution by Working Section

Working _Section

		Frequency	Percent	Valid Percent-	Cumulative Percent
Valid	Ware house	11	2.4%	2.4%	2.4%
	Winding	21	4.7%	4.7%	7.1%
	Knitting	93	20.7%	20.7%	27.8%
	Linking/ Trimming/- Mending	146	32.4%	32.4%	60.2%
	Washing	17	3.8%	3.8%	64.0%
	Sewing	25	5.6%	5.6%	69.6%
	Iron	30	6.7%	6.7%	76.2%
	Quality	41	9.1%	9.1%	85.3%
	Packing	37	8.2%	8.2%	93.6%
	Boiler	15	3.3%	3.3%	96.9%
	Generator	14	3.1%	3.1%	100.0%
Total		450	100.0%		

A detailed breakdown of experience levels is as follows Table 3. Respondents with 0–1 years of experience constitute 5.3% of the sample. Those with 1–3 years of experience account for 16.9%. The largest proportion is observed in the 4–6 years category, representing 24.7% of participants. Individuals with 7–10 years of experience comprise 21.1%. The most experienced group,

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with over 10 years of service, constitutes 32% of the sample.

Table 3: Frequency and Percentage Distribution by Working Experience

Working Experience

		Frequency	Percent	Valid Percent-	Cumulative Percent
Valid	0-1 Years	24	5.3%	5.3%	5.3%
	1-3 Years	76	16.9%	16.9%	22.2%
	4-6 Years	111	24.7%	24.7%	46.9%
	7-10 Years	95	21.1%	21.1%	68.0%
	10+ Years	144	32.0%	32.0%	100.0%
Total		450	100.0%		

As presented in Table 4, The analysis of workforce designations, a substantial majority—92.0% (n = 414) were designated as Operators, while only 8.0% (n = 36) held the position of Helper.

Table 4. Frequency and Percentage Distribution by Designation

Designation

		Frequency	Percent	Valid Percent-	Cumulative Percent
Valid	Helper	36	8.0%	8.0%	8.0%
	Operator	414	92.0%	92.0%	100.0%
Total		450	100.0%		

The frequency distribution of educational qualifications is presented in Table 5. High School: 42.4% (n=191) largest group. SSC: 24.4% (n=110). Primary: 21.3% (n=96). HSC: 9.3% (n=42). Graduation: 2.4% (n=11) smallest group.

Table 5: Frequency and Percentage Distribution by Education Level

Education

		Frequency	Percent	Valid Percent-	Cumulative Percent
Valid	Primary	96	21.3%	21.3%	21.3%
	High School	191	42.4%	42.4%	63.8%
	SSC Pass	110	24.4%	24.4%	88.2%
	HSC Pass	42	9.3%	9.3%	97.6%
	Graduation	11	2.4%	2.4%	100.0%
Total		450	100.0%		

Table 6, Working hours (n=450): 66.2% work ≥12 hours/day; 22.4% work 10 hours; 10.2% work 11 hours; 0.7% work 9 hours; only 0.4% follow the 8-hour standard. Overall, over 98% exceed the recommended 8-hour day.

Table 6: Frequency and Percentage Distribution by Working Hours

Working hour

		Frequency	Percent	Valid Percent-	Cumulative Percent
Valid	8 hours	2	.4%	.4%	.4%
	9 hours	3	.7%	.7%	1.1%
	10 hours	101	22.4%	22.4%	23.6%
	11 hours	46	10.2%	10.2%	33.8%
	12+ hours	298	66.2%	66.2%	100.0%
Total		450	100.0%		

Analysis of Workplace Dust

Table 7, Total 450 respondents, n=303 (67.3%) identified workplace dust as a concern and n=147 (32.7%) did not. Among those selecting dust, all valid responses (n=303; 100%) affirmed concern underscoring dust as a significant occupational hazard.

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Table 7: Frequency Distribution of Workplace Dust

workplace dust

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	303	67.3%	100.0%	100.0%
Missing	.	147	32.7%		
Total		450	100.0%		

Table 8 shows, out of total number of valid responses, 303 and 147 were not applicable.8 Respondents (2.6%) reported they have encountered shortness of breath directly associated with the exposure to dust. Most respondents (n=237, 78.2%) reported that they did not have breathing problems, implying air quality is more commonly viewed to be reasonable or that most workers are relatively insensitive to dust. Further, 58 (19.1%) respondents had problems with breathing on occasion.

Table 8: Frequency Distribution with percentages of Breathing Problem of Dust Area.

Breathing Problem due to _ dust

		Frequency	Percent	Valid Percent-	Cumulative Percent
Valid	Yes	8	1.8%	2.6%	2.6%
	Sometimes	58	12.9%	19.1%	21.8%
	None	237	52.7%	78.2%	100.0%
Missing	.	147	32.7%		
Total		450	100.0%		

Table 9 shows that within the valid responses, 21 participants (6.9%) reported experiencing an allergy or asthma problem, whereas 282 respondents (93.1%) indicated no such issues.

Table 9: Frequency Distribution for Allergy or Asthma problem.

Any Allergy or Asthma _problem

		Frequency	Percent	Valid Percent-	Cumulative Percent
Valid	Yes	21	4.7%	6.9%	6.9%
	No	282	62.7%	93.1%	100.0%
Missing	.	147	32.7%		
Total		450	100.0%		

Table 10 and Figure 1, Bar Chart Analysis associated with doctor visit who are working in the dust areas. The breakdown is as follows: Cardio (1.0%, n = 3), Diabetics (0%, n = 0), Respiratory (0.3%, n = 1), Liver Diseases (0.3%, n = 1), Tuberculosis (0%, n = 0), Musculoskeletal (0.3%, n = 1), Anemia (0%, n = 0), Allergy (1.7%, n = 5), Vision (0.7%, n = 2), and Others (11.2%, n = 34).

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Table 10: Statistics for reasons of visiting the doctor with descriptive statistics.

Statistics

		Reason of visit the doctor_Cardio-	Reason of visit the doctor_ Diabetics	Reason of visit the ctor_Respirator	Reason of visit the doctor_liver	Reason of visit the doctor_TB	Reason of visit the ctor_Musculoskelet	Reason of visit the doctor_Anemia-	Reason of visit the doctor_ Allergy	Reason of visit the doctor_Vision	Reason of visit the doctor_Others-
N	Valid	303	303	303	303	303	303	303	303	303	303
	Missing	147	147	147	147	147	147	147	147	147	147
Mean		.01	.00	.00	.00	.00	.00	.00	.02	.01	.11
Median		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Std Dev		.10	.00	.06	.06	.00	.06	.00	.13	.08	.32
Minimum		Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	not Selected	Not Selected	not Selected	Not Selected
Maximum		Cardio	Not Selected	Respiratory	Liver diseases	Not Selected	Musculoskeletal	not Selected	Allerggy	Vision Problem	Others

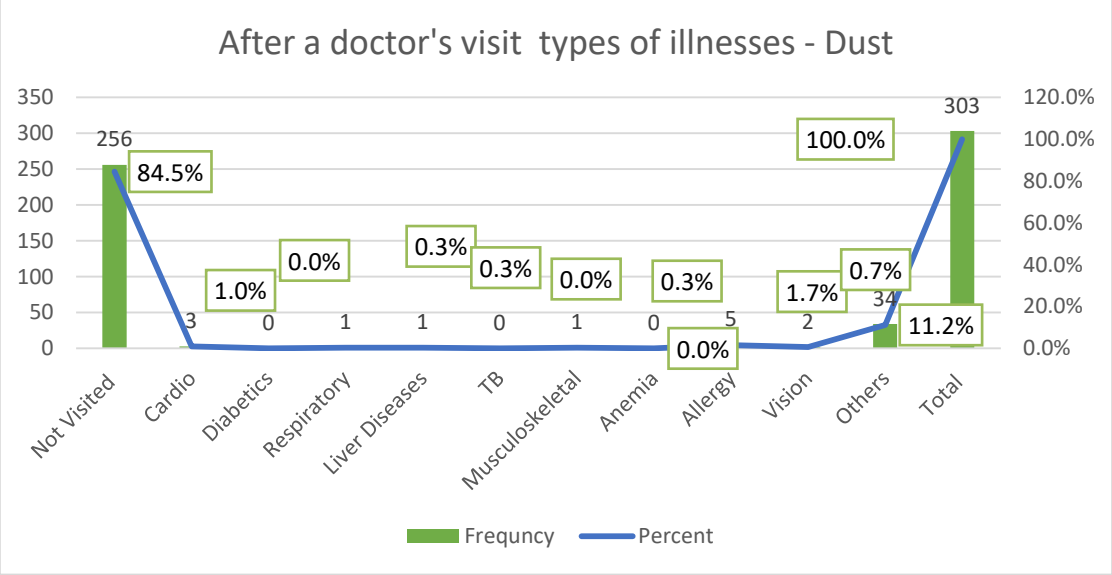

Figure 1. Graphical representation after a doctor's visit types of illnesses (Frequency and Percentages).

Analysis of Workplace Temperature(Heat)

Data:

Table 11, temperature concerns, the analysis is based on the use of n=116 valid responses (25.8% of total n=450) as 334 entries were excluded due to the lack of reporting heat concerns. Based on respondents that the temperature conditions at workplace were on average 33.33 °C (SD 3.48 °C) with the minimum and maximum values being 27 °C and 42 °C, respectively.

Table 11: Descriptive statistics of indoor temperature in the workplace.

Descriptive Statistics

	N	Mean	Std Dev	Minimum	Maximum
Recent Temparature level _inside_Celsius_	116	33.33	3.48	27	42
Valid N (listwise)	450				
Missing N (listwise)	334				

Table 12, shows the mean reported indoor summer average temperature was 33.43°C, with a standard deviation of 3.41°C, indicating moderate variability among the responses. Recorded temperatures ranged from a minimum of 28°C to a

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maximum of 44°C, yielding an overall range of 16°C.

Table 12: Descriptive Statistics for Average Temperature (Summer Season Inside)

Descriptive Statistics

	N	Mean	Std Dev	Minimum	Maximum
Average Temparature summer_season inside_°C	116	33.43	3.41	28	44
Valid N (listwise)	450				
Missing N (listwise)	334				

Table 13 interpreting that , among the 116 valid respondents, doctor visits in the heat area workers were reported for "other" reasons (16%, n=19 workers), allergies (3%, n=3), respiratory issues (2%, n=2), tuberculosis (2%, n=2), liver problems (1%, n=1), anemia (1%, n=1), and vision problems (1%, n=1), while no visits were reported for cardio, diabetes, or musculoskeletal issues (0%).

Table 13: Descriptive Statistics for Reasons for Doctor Visit

Statistics

		Reason of visit the Doctor_ Cardio	Reason of visit the tor_Diabe	Reason of visit the br_Respira	Reason of visit the ctor_Liver	Reason of visit the r_Tubercu	Reason of visit the Musculos	Reason of visit the tor_Anem	Reason of visit the ctor_Allerg	Reason of visit the octor_Visio Problem-	Reason of visit the ctor_Othe
N	Valid	116	116	116	116	116	116	116	116	116	116
	Missing	334	334	334	334	334	334	334	334	334	334
Mean		.00	.00	.02	.01	.02	.00	.01	.03	.01	.16
Median		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Std Dev		.00	.00	.13	.09	.13	.00	.09	.16	.09	.36

Table 14 and the bar graph in Figure 3 illustrates the frequency and percentage of health problems related to heat exposure. Among 116 total responses, 86.2% (100 individuals) reported no heat-related problems. Heat exhaustion was the most reported issue, with 10.3%,n=12, heat rash 1.7% n=2 and heat synope 1.7%, n=2. Other problems such as heat rash, heat cramps, heat stroke, heat syncope, and hypertension were rarely reported.

Table 14: Descriptive Statistics for Problems Faced Due to Heat (Specific Conditions)

Statistics

		Problem Due to Heat_Heat Rash	Problem Due to Heat_Heat Cramps	Problem Due to Heat_Heat Exhaustion	Problem Due to Heat_Heat Stroke	Problem Due to Heat_Heat Synope	Problem Due to eat_Hypertensio
N	Valid	116	116	116	116	116	116
	Missing	334	334	334	334	334	334
Mean		.02	.00	.10	.00	.02	.00
Median		.00	.00	.00	.00	.00	.00
Std Dev		.13	.00	.31	.00	.13	.00
Minimum		Not Selected	Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
Maximum		Heat Rash	Not Selected	Heat Exhaustion	Not Selected	Heat Synope	Not Selected

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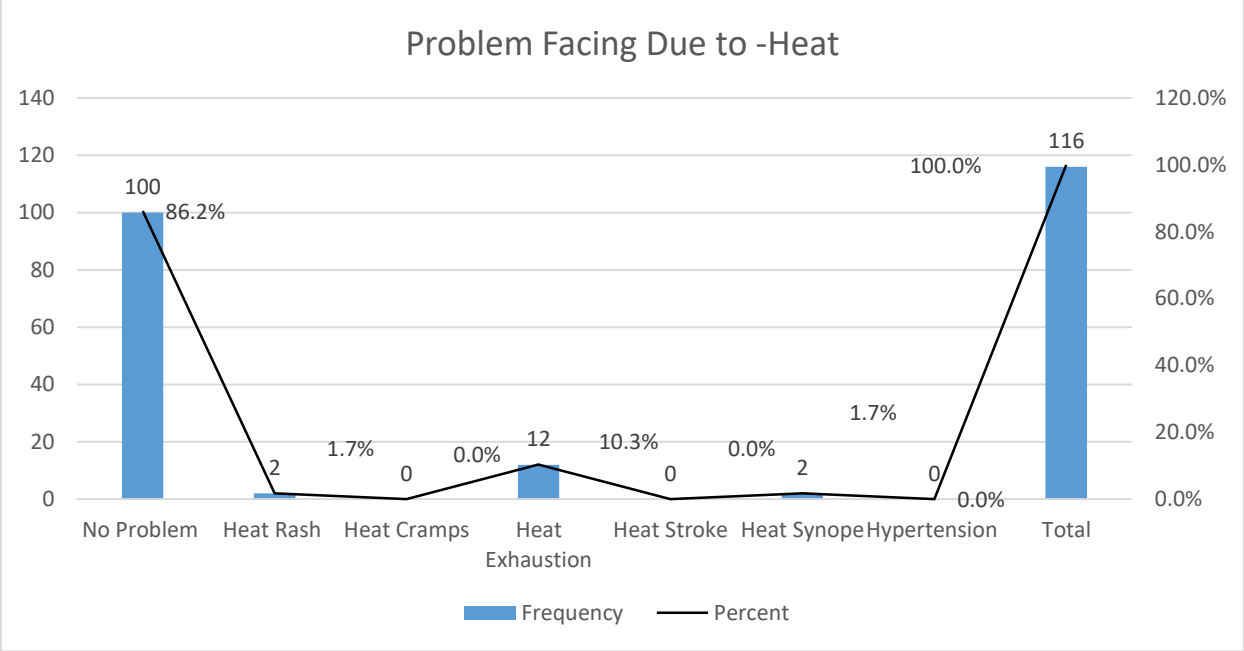

Figure 2. Problems Faced Due to Heat (Frequency and percentages).

Pearson Correlation Coefficient

The Pearson correlation matrix was utilized to assess the relationship between indoor and outdoor temperatures during the summer season. The analysis provides insights into the strength and direction of association between these two variables.

Table 15, the correlation between the indoor temperature variable and itself is 1.000, reflecting a perfect positive correlation, as expected when comparing identical datasets. The correlation between indoor and outdoor summer temperatures is 0.549, indicating a moderate positive relationship. This suggests that increases in outdoor temperature are moderately associated with increases in indoor temperature. Statistical Significance both correlation coefficients are associated with a p-value of 0.000, denoting statistical significance at the 0.01 level. This confirms that the observed relationships are unlikely to be attributable to random variation. Sample Size The analysis is based on 116 valid observations. This sample size is considered adequate to ensure the reliability of the correlation estimates. The moderate positive correlation (r = 0.549) between indoor and outdoor temperatures implies that, while there is a statistically significant association, the relationship is not absolute. This finding indicates that higher outdoor temperatures are generally accompanied by higher indoor temperatures; however, additional factors such as ventilation, insulation, or air conditioning may also influence indoor thermal conditions.

The results demonstrate a moderate, statistically significant positive correlation between indoor and outdoor temperatures during the summer season. As outdoor temperatures rise, indoor temperatures also tend to increase, though not in a perfectly linear manner. These findings suggest that interventions targeting outdoor temperature regulation such as improved shading, enhanced air circulation, or better insulation may have a moderate effect on managing indoor thermal environments during the summer months.

Table 15. Correlation between Average Summer Season Temperature Inside and Outside (°C)

Correlations

		Average emparatur nmer_seas Inside_°C-	Average emparatur mmer_seas Outside _°C
Average Temparature summer_season inside_°C	Pearson Correlation	1.000	.549
	Sig. (2-tailed)		.000
	N	116	116
Average Temparature summer_season Outside _°C	Pearson Correlation	.549	1.000
	Sig. (2-tailed)	.000	
	N	116	116

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Analysis of Workplace Noise Data:
As shown in Table 16, 130 valid responses were analyzed; 320 were omitted since noise was not raised as an issue. The bar chart Frequency analysis Figure 4 showed that (36.9%, n=48) reported impaired communication and (36.2%, n=47) reported hearing problems. Other issues were less common: stress and fatigue (5.4%, n=7), blood pressure (3.8%, n=5), and sleep disturbance (3.1%, n=4). Only (14.6%, n=19) reported no problems.

Table 16. Descriptive Statistics for Types of Problems Faced Due to Workplace Noise

Statistics

		Types of problem_Due to noise_Hearing Problem	Types of problem_Due to noise_Stress & Fatigue	Types of problem_Due to noise_Blood Pressure	Types of problem_Due to noise_Impaired Communication	Types of problem_Due to noise_Sleep Disturbance
N	Valid	130	130	130	130	130
	Missing	320	320	320	320	320
Mean		.36	.05	.04	.37	.03
Median		.00	.00	.00	.00	.00
Std Dev		.48	.23	.19	.48	.17
Minimum		Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
Maximum		Hearing Problem	Stress & Fatigue	Blood Pressure	Impaired Communication	Sleep Disturbance

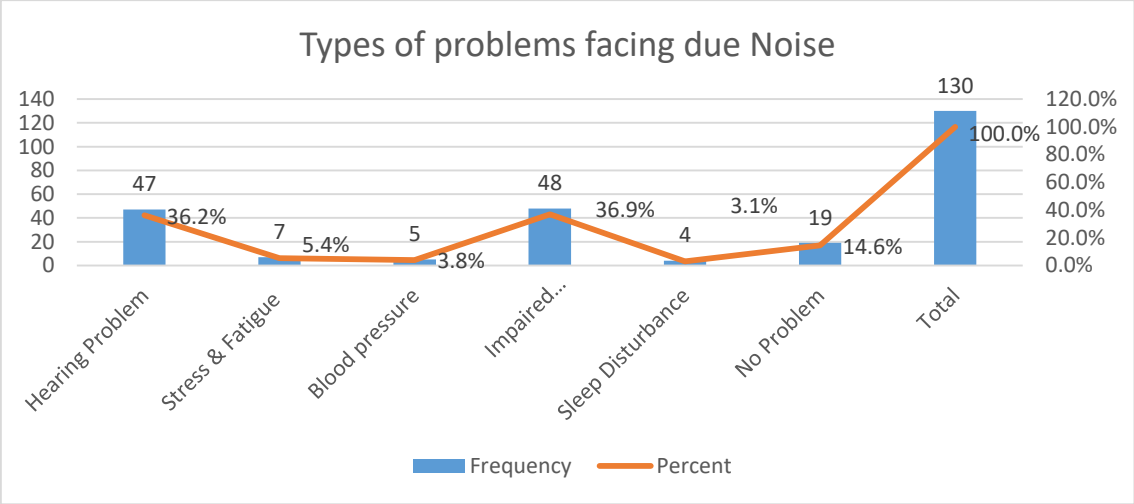

Figure 3. Distribution of Types of Problems Faced Due to Workplace Noise

Table 17 illustrates shortly that Among the 130 valid responses, 3.1% (n=4) reported having a hearing problem, while 96.9% (n=126) did not.

Table 17. Frequency and Percentage Distribution of Hearing Problems Among Workers in Noise Areas.

Have any hearing Problem

		Frequency	Percent	Valid Percent-	Cumulative Percent
Valid	Yes	4	.9%	3.1%	3.1%
	No	126	28.0%	96.9%	100.0%
Missing	.	320	71.1%		
Total		450	100.0%		

Frequency Distribution As detailed in Table 18, only 2 respondents (1.5% of valid responses) reported having visited a hospital or doctor to hear problems related to noise, while 128 respondents (98.5%) indicated they had not.

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Table 18. Distribution of Respondents Who Have Ever Visited a hospital or Doctor for Hearing Problems.

have ever visited at hospita or doctor for hearing problem

		Frequency	Percent	Valid Percent-	Cumulative Percent
Valid	Yes	2	.4%	1.5%	1.5%
	No	128	28.4%	98.5%	100.0%
Missing	.	320	71.1%		
Total		450	100.0%		

Table 19 is showing 130 valid occupational noise exposure data, and 320 of the remaining workers did not report levels because their work did not expose them to noise. Overall, the mean noise level was 78.80 dBA, with a standard deviation of 7.97, and a minimum and maximum of 64.00 and 108.70, respectively, with a range of 44.70. While the majority of reported values are above 70 dBA, indicating potential occupational health risks.

Table 19. Descriptive Statistics for Noise Levels in Working Areas (dBA)

Descriptive Statistics

	N	Mean	Std Dev	Range	Minimum	Maximum
Noise level working areas_dBA	130	78.80	7.97	44.70	64.00	108.70
Valid N (listwise)	450					
Missing N (listwise)	320					

ANOVA Test of Differences in Noise Levels across Working Sections:

Breakdown of the Data: Sum of Squares, between Groups: The variation between the different working sections, which is 966.64. Within Groups: The variation within each working section, which is 233.05. Total: The total variation, which is 1199.69.

- **Degrees of Freedom (df):** Between Groups: 44 degrees of freedom. Within Groups: 85 degrees of freedom. Total: 129 degrees of freedom.
- **Mean Square: Between Groups:** The mean square for between groups is calculated by dividing the Sum of Squares (966.64) by the degrees of freedom (44). This gives 21.97.
- **Within Groups:** The mean square for within groups is calculated by dividing the Sum of Squares (233.05) by the degrees of freedom (85), which results in 2.74.
- **F Value:** The F statistic is calculated by dividing the Mean Square Between Groups by the Mean Square Within Groups: F=21.972.74=8.01F = \frac{21.97}{2.74} = 8.01

This value (8.01) is used to test if the differences between the groups are statistically significant.

Significance (Sig.): The p-value (0.000) indicates the probability of observing the results assuming that there is no difference between the groups. Since the p-value is less than the typical threshold (0.05), we can conclude that there is a statistically significant difference between the working sections.

Analysis: The ANOVA test results suggest that there is a statistically significant difference in the noise levels between the different working sections, as indicated by the F-value (8.01) and the p-value (0.000). The p-value being less than 0.05 shows strong evidence against the null hypothesis, meaning the differences between the working sections are not due to random chance. The between-group variation (966.64) is much larger than the within-group variation (233.05), reinforcing the conclusion that the working sections differ significantly in terms of noise levels. In summary the noise levels differ significantly across the working sections. The result implies that the working sections are likely to have different impacts or characteristics related to noise.

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Table 20. ANOVA Test of Differences in Noise Levels across Working Sections.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Working _Section	Between Groups	966.64	44	21.97	8.01	.000
	Within Groups	233.05	85	2.74		
	Total	1199.69	129			

Analysis of Workplace Chemical

Table 21 shows 20 valid responses total 18 individuals (90% of valid responses) indicated "Not Selected," meaning they did not experience any health problems due to chemicals. 2 individuals (10% of valid responses) reported suffering from dermatitis or skin irritation.

Table 21. Distribution of Respondents by Types of Problems Due to Chemical Exposure

Types of Problem due to Chemical

		Frequency	Percent	Valid Percent-	Cumulative Percent
Valid	Not Selected	18	4.0%	90.0%	90.0%
	Dermatities/- Skin Irritation	2	.4%	10.0%	100.0%
Missing	.	430	95.6%		
Total		450	100.0%		

Table 22 and the bar chart figure 5 shows that 85% (17 out of 20) of respondents did not visit a doctor for any disease related to chemical exposure. Dermatitis/Skin Irritation This was the most frequently reported disease, with 2 cases (10%). Allergy was reported by 1 respondent (5%).

Table 22. Descriptive Statistics of Types of Diseases among Chemical Area Workers after Doctor Visit

Statistics

		Types of diseases_Dermatities/- skin irritation	Types of eases_Respirato Problem	Types of liseases_Allergy	Types of eases_Headache Dizziness	Types of diseases_Liver Diseases
N	Valid	20	20	20	20	20
	Missing	430	430	430	430	430
Mean		.10	.00	.05	.00	.00
Median		.00	.00	.00	.00	.00
Std Dev		.31	.00	.22	.00	.00
Minimum		Not Selected	Not Selected	Not Selected	Not Selected	Not Selected
Maximum		Dermatities/skin irritation	Not Selected	Allergy	Not Selected	Not Selected

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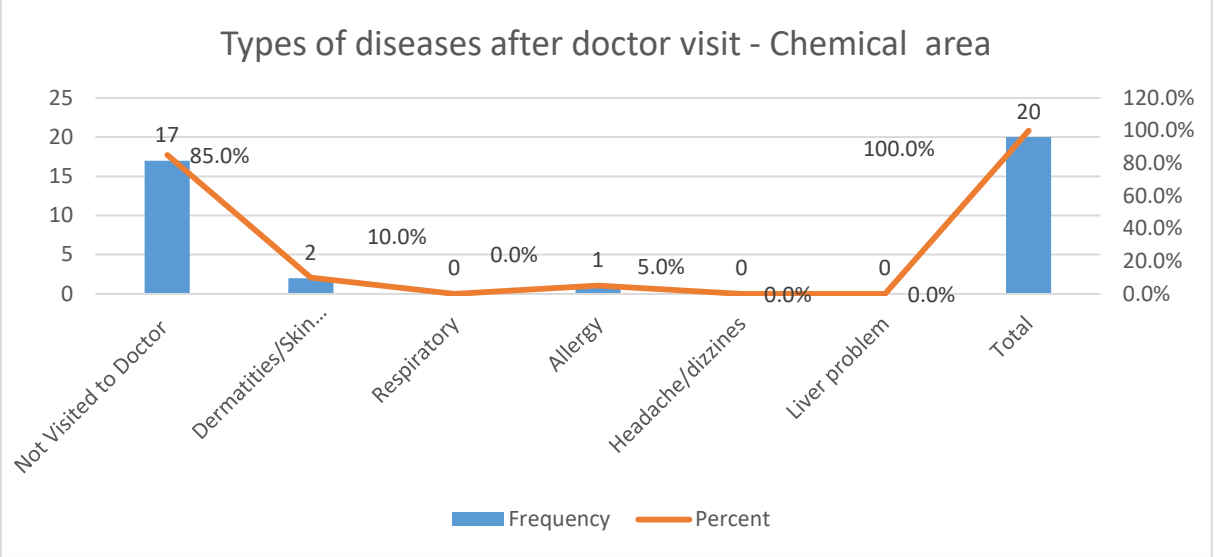

Figure 4. Frequency and Percentage of Types of Diseases among Chemical Area Workers after Doctor Visit

DISCUSSION

The high reported incidence of long working hours in the study presented important issues for labour conditions. The importance of long workdays has been well described in literature as a contributor to physical–mental exhaustion, reduced productivity, as well as increasing the incidences of work-related injuries, particularly in labor-intensive industries like garment. Such evidence urges a proactive enforcement of labor standards and draws attention toward adhering to ILO guidelines at the workplace level to protect workers' well-being.

The help of plenty of the workforce, recognized that dust in the office is a big health threat, with everybody affected proving how required it's to press for dust management methods. Although the majority of workers who are concerned with dust also view overall cleanliness as acceptable, the neutral and negative responses show that hygiene could still be improved. Overall satisfaction with the cleanliness of the workplace is positive, but action should still be taken to ensure that those satisfying with their cleanliness are either neutral or not happy. These findings indicate that focused interventions on air quality and physical and acoustic stressors should be considered to facilitate a healthier work environment.

Views on the ventilation system are similarly good, although a sizeable minority are neutral, and almost as many are negative on the ventilation. This shows the opportunity to improve ventilation even further to benefit all staff. Even if most workers don't have breathing problems from dust, the data are significant enough that a portion of the workforce is affected some or all of the time. This highlights the need for continuous airborne pollutants monitoring and intervention for at-risk groups to maintain a healthy workplace.

Among workers reporting heat-related problems, high proportions work at indoor temperatures above 30°C and some have extreme indoor environmental conditions of up to 44°C while average indoor peak summer temperatures in impacted settings were 33.43°C, showing that premises with high thermal environments are not uncommon. These findings highlight the importance of targeted occupational health interventions to prevent risk of heat exposure, especially when temperature regulation may be limited.

Bangladesh Labour Act of 2006 requires a provision for workers' comfort in excessive heat. Specifically, under section 52(2), workers must be provided with a comfortable working environment in the event of increasing temperatures. Article 50(6) and Section 58(3) say that establishments with more than 250 employees must have out there chilled drinking water in a canteen and restrooms. (Anon, n.d.)

The analysis suggests that the self-reported exorbitant workplace noise among validated respondents. Workers may benefit from organizations regularly monitoring workplace sound levels and implementing focused measures to reduce the negative effects of noise. In addition, we should increase the participation rate of employee surveys; when employees are more engaged with such surveys, it will be easier to have a full understanding of the workplace

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environmental surroundings. To make sure we get real and true data on what is going wrong at the workplace within organizations, both employee and employer needs to create a heavy transparent and reporting culture, that will build workplace awareness. most respondents reported at least one noise problem, mostly hearing and communication.

In the case of respondents who said that ' workplace noise" or 'noise at this workplace' is a problem, the valid dataset shows that levels of noise are clustered in 78.8 dBA, maximum 108.70 dBA, minimum 64.0 dBA with moderate dispersion and a right-skewed distribution. While the noise exposure information was available only for those workers who worked in jobs where noise at work was perceived to be a significant issue (and therefore noise was not considered to be a problem), this targeted analysis provides an accurate interpretation of the noise exposure among those affected workers.

Noise Pollution (Control) Rules, 2006: Industrial areas: 75 dB (day including night (6 AM-9 PM) and 70 dB night. Going beyond these limits is punishable offense.(Anon, n.d.)

The valid data descriptively and graphically shows a low self-reported health occurrence associated with chemical exposure among workers. This said, only 20 of the workers who participated flagged chemicals as an issue arising in their own workplace, with the report highlighting that sweater factories tend to have very low levels of chemicals used, mainly just in the washing of detergents. Most chemicals applied are neither high-risk nor acute. Thus some workers who raised concerns about being exposed chemicals had never seen a physician for care since entering the chemical sector.

Moreover, the analysis indicates that the outdoor temperature component is the most significant variable affecting the indoor thermal condition of the survey cases. The summer season reached a moderate and statistically significant positive correlation between indoor and outdoor temperatures. When outdoor temperatures warm, indoor temperatures tend to rise, although not in a linear fashion. Besides, noise was significantly different in the different sections of work which tell us that each of these areas may have their own noise characteristics or impact.

Bangladesh's garment industry has undergone remarkable expansion over the last several decades and has been an important factor for the nation's economic development. Nevertheless, the industry has long battled with worker health and safety issues from day one. These are but a few of the multitude of challenges, challenges that we are just beginning to understand the true scale of. The long working hours have exceeded the legal maximum at times, and most of the excess time leading to fatigue and other health problems. Progress has undeniably been made but much work remains to be done to protect worker health and safety in Bangladesh and particularly for those garment workers producing sweaters. However, there is no major research specifically concerning health and safety issue of sweater garment sector in Bangladesh has been conducted yet.

LIMITATIONS

The manufacturing factories in the present study are only limited to export-oriented sweater factories in Dhaka and Chattogram divisions industrial zones, which may not be generalizable to the larger garment sector in the country, especially non-export factories or those in other regions of the country. Due to the sampling strategy of cluster sampling, we do not have a complete representation of the different types of factories that exist within the industrial zones, which can lead to an underrepresentation of smaller factories that are more isolated and therefore affect the results. Sample size over worker/factory does not reflect the exact variety of working conditions as only some sections of operations are included; other departments especially office management may not be included at all, making summary data biased. Self-reported data could be biased or inaccurate, with workers underreporting health problems or hazards for fear of retaliation, and management selectively reporting on health and safety practices. A limitation of the data collection is that the cross-sectional design does not permit any assessment of longer health consequences or the effectiveness of historical interventions, with working conditions only recorded at one time point. The secondary data collected from management of the surveyed factories, available local residents, and published sources may not be as current as necessary or applicable to the conditions of the surveyed factories directly and such limitations can weaken the robustness of the analysis. Although obtaining mixed methods is helpful, integrating both types of data may create difficulties in terms of consistency and interpretation (e.g. comparing more subjective responses from interviews and more structured

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questionnaire data). Even if the research is related to the production of sweaters only, which does not generalize to problems in other types of garment production, this also makes the findings not applicable to the entire garment sector.

Recommendations

Since long working hours emerged as a key issue, particularly in labor-intensive environments such as in the sweater garment sector, the urgent and proactive implementation of labor laws that strictly prohibit overwork,

The relatively high number of self-reported allergies suggest continuous exposure to dust or textile inhalable particles and highlight the need for improved air filtration, better housekeeping practices, and ventilation, especially in dusty areas of factories. The concerns workers have expressed that exposure at the workplace mainly to dust, noise and heat emphasize that there is environmental intervention required, such would be dust suppression, noise dampening technologies and climate control systems to reduce the including effects of these exposures.

The fact that airborne allergens are still present, and can irritate at least some of the staff, even if not yet applied consistently, means that air quality monitoring is still needed, especially in high exposure areas, to ensure that air is fit to breathe.

Workplaces that particularly experience extreme temperatures some almost hitting 44°C should also have appropriate heat-protection measures like heat resistant PPE and rest areas that accommodate this, and these serious occupational health concerns are imperative to be addressed as per provisions of Bangladesh Labour Act.

Thermal environments should be evaluated on a routine basis, particularly during the summer season, to assess exactly when and where workers are most at risk of heat stress through direct-year-round, real-time quantitative indoor and outdoor temperature comparisons.

With respect to noise exposure periodic noise level measurements should be undertaken, and corrective measures should be based upon the sections-specific noise profiles. Management should ensure PPE for the noise areas workers and continue follow up to ensure the PPE is worn by the workers.

Chemical exposure while only a small number of workers reported chemical exposure, the exposure and lack of follow-up care and procedures highlight the fact that even limited chemical use, such as detergent washing of sweaters in a factory, still needs more defined safety measures. Providing clear signage for safety in these areas, enforcing regular PPE use in these libraries, offices, labs, or clinics, and scheduling regular health assessments can better protect workers.

Specifically, management should be more proactive (both in terms of the number and nature of programs, and of their visibility) in all aspects of occupational health dust, heat, noise, chemicals (that include biological, as well as chemical, hazards, and many are coming around to heat) so that workers will feel assured that they have a voice and that they will be safeguarded. However, the analysis from only export-oriented sweater factories in Dhaka and Chattogram division means that further research would be needed to understand non-export factories and other forms of garment production to be able to make more general recommendations for the sector. Longitudinal studies are needed for insight into the chronic effects of work-related exposures, and to assess the long-term effectiveness of health and safety interventions. Since this study utilized quantitative and qualitative interviews and structured surveys, future research should take caution, maintaining consistency between methods used to strengthen overall interpretation of results. Finally, by creating an environment of transparent reporting between employees and employers, this will increase participation in worker clinical surveys and more honest reporting of health hazards in the workplace, which is essential to designing effective interventions and a culture of safety within the organization.

REFERENCES

1. Ahmed, S. M. T., Karmaker, C. L., & Ahmed, M. E. (2019). Assessment of safety, health and environmental risk factors in garments industries of Bangladesh. *Journal of Applied Research on Industrial Engineering, 6*(3). https://doi.org/10.22105/jarie.2019.191093.1093
2. Ahmed, T., Rahman, M. M., Hasan, M., & Hossain, M. A. (2020). An extensive analysis of the health hazards for RMG workers in apparel sector of Bangladesh. *Journal of Textile Engineering, 6*, 141–146. https://doi.org/10.15406/jteft.2020.06.00242
3. Alam, S., Islam, M. S., & Rahman, M. M. (2016). The impact of noise pollution on workers' health in selected industries of

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Mirzapur industrial area, Tangail, Bangladesh. *Journal of Environmental Science and Natural Resources, 9*(2), 155–160.

4. Alam, S., Bashar, A., & Hoque, M. (2020). Factors affecting occupational injury and death: Insights from ready-made garments industry of Bangladesh. *Test Engineering and Management, 83*, 7872–7888.
5. Bangladesh Garment Manufacturers and Exporters Association. (2023). *BGMEA at a glance*. https://www.bgmea.com.bd/page/aboutus
6. Bangladesh Labour Act, 2006 (Amended up to 2018). (2018). Ministry of Labour and Employment, Government of Bangladesh. https://mccibd.org/wp-content/uploads/2021/09/Bangladesh-Labour-Act-2006_English-Upto-2018.pdf
7. Bick, R., Halsey, E., & Ekenga, C. C. (2018). The global environmental injustice of fast fashion. *Environmental Health, 17*(1), Article 92. https://doi.org/10.1186/s12940-018-0433-7
8. Canada, Health. (2012). *Exposure and health effects of chemicals*. https://www.canada.ca/en/health-canada/services/health-effects-chemical-exposure.html
9. Chan, A. P. C., & Yi, W. (2016). Heat stress and its impacts on occupational health and performance. *Indoor and Built Environment, 25*(1), 3–5. https://doi.org/10.1177/1420326X15622724
10. Chowdhury, A. (2014). Environmental impacts of the textile industry and its assessment through life cycle assessment. In *Handbook of sustainable apparel production* (pp. 1–39). Springer. https://doi.org/10.1007/978-981-287-110-7_1
11. Common Objective. (n.d.). *Death, injury and health in the fashion industry*. http://www.commonobjective.co/article/death-injury-and-health-in-the-fashion-industry
12. Exposure to dust and endotoxin in textile processing workers. (2010). *The Annals of Occupational Hygiene*. https://doi.org/10.1093/annhyg/meq084
13. Faysal, G. M., Azad, T. N. S., & Moon, J. M. (2022). The industrial health hazard among workers of apparel sector in Bangladesh. *The Indonesian Journal of Occupational Safety and Health, 11*(1), 133–142. https://doi.org/10.20473/ijosh.v11i1.2022.133-142
14. Hussain, M. I. B. (n.d.). *Impact of thermal environment on occupational health at readymade garments buildings in Bangladesh*.
15. International Labour Organization. (n.d.). *Chemical safety and the environment*. https://www.ilo.org/global/topics/safety-and-health-at-work/areasofwork/chemical-safety-and-the-environment/lang--en/index.htm
16. Islam, S. (2020). A study on the solutions of environment pollutions and worker's health problems caused by textile manufacturing operations. *Biomedical Journal of Scientific & Technical Research, 28*(4). https://doi.org/10.26717/BJSTR.2020.28.004692
17. Mahmud, M. S., Rahman, M. M., & Hasan, M. (2017). Prevalence of health hazards: A study on the female workers of garment industry in Gazipur district, Bangladesh. *Journal of Applied and Advanced Research, 2*(3), 184. https://doi.org/10.21839/Jaar.2017.V2i3.91
18. Mehwish, N., & Mustafa, U. (n.d.). *Impact of dust pollution on worker's health in textile industry: A case study of Faisalabad, Pakistan*.
19. Nasrin, S., Ahmed, F., & Chowdhury, R. (2019). The relationship between conversion factors and health: Evidence from the ready-made garment workers in Bangladesh. *Journal of Asian and African Studies, 54*(1), 20–37. https://doi.org/10.1177/0021909618796662
20. Noise pollution (control) rules, 2006. (2006). Government of the People's Republic of Bangladesh. https://www.researchgate.net/figure/Noise-pollution-control-rules-2006-The-Government-of-the-Peoples-Republic-of_tbl1_372787769
21. Occupational noise exposure. (2025). Interior Finish Contractors Association. https://www.ifcassociation.com/safety/blog/occupational-noise-exposure
22. Readymade garments industry of Bangladesh. (2015). *Garments Merchandising*. https://garmentsmerchandising.com/readymade-garments-industry-of-bangladesh/
23. Sattar, S., & Laila, K. (2018). The effect of health problems on quality of work life among garments workers in Dhaka city. *Scientific Research Journal, 6*(7). https://doi.org/10.31364/SCIRJ/v6.i7.2018.P0718539
24. Singh, Z., & Chadha, P. (2016). Textile industry and occupational cancer. *Journal of Occupational Medicine and Toxicology, 11*(1),

Publisher: SARC Publisher

Article 39. https://doi.org/10.1186/s12995-016-0128-3
25. Stansfeld, S. A., & Matheson, M. P. (2003). Noise pollution: Non-auditory effects on health. *British Medical Bulletin, 68*(1), 243–257. https://doi.org/10.1093/bmb/ldg033
26. Talapatra, S., & Rahman, M. H. (2016). Safety awareness and worker's health hazards in the garments sector of Bangladesh. *European Journal of Advances in Engineering & Technology*, 44–49.
27. Trading Economics. (2024). *Bangladesh labor force, total*. https://tradingeconomics.com/bangladesh/labor-force-total-wb-data.html
28. World Air Quality Index Project. (2023). *Air pollution in Bangladesh*. https://aqicn.org/country/bangladesh/
1. AQI India. (2023). *Bangladesh air quality index (AQI): Real-time air pollution level*. https://www.aqi.in/dashboard/bangladesh.

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