



HEALTH RISKS OF INDUSTRIAL EXPOSURE: A CROSS-SECTIONAL STUDY AMONG FACTORY WORKERS IN SOUTH ASIA

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Abstract

This cross-sectional research is based on exploring the health risks of factory workers in South Asia, which is aimed to examine the effect of factory exposure to different hazardous environments. The research gathered the data of the workers of diverse sectors, evaluating the cases of respiratory illnesses, musculoskeletal trauma, skin illnesses and psychological strain. Through this in-depth analysis it was revealed that there was a strong association between sustained exposure to dust, chemicals and mechanical hazard with the development of respiratory diseases, such as chronic bronchitis and asthma. There were higher musculoskeletal disorders especially of the back and the joints in those workers who were engaged in a manual labor or repetitive work. Moreover, workers who worked with chemicals or had to work in harsh industrial settings tended to have skin conditions like dermatitis. The research also pointed out a very high level of psychological stress in the form of anxiety and depression that was associated with the long working hours, poor work-life balance, and insufficient safety precautions. These revelations highlight the necessity to have better occupational health policies, enhanced safety practices, and psychological support networks to reduce the health hazards of industrial exposure in South Asia.

INTRODUCTION

The issue of occupational health remains a burning topic on the international level, and the number of such workers who die due to work-associated diseases and injuries is 2.8 million annually (Rajak et al., 2023). These risks are aggravated in South Asia by the growing rates of industrialization, which, in its turn, can be also supported by the lack of protection, not to mention medical assistance, particularly in relation to factory workers (Rhaman et al., 2019). This scenario justifies the need to conduct an elaborate research into the certain health morbidities of industrial employees in the area (Sowmiya et al., 2020) (Choudhury et al., 2023). This gap is the focus of the paper since it discusses the health status of various categories of factory workers in South Asia including the textile industry, the brick kiln industry, and other factory work and thus illuminates on the common occupational risks and their associated health outcomes (Kazi and Bote, 2019) (Islam, 2022). These causes are usually common health problems among the employees of the cotton textile industry e.g. high blood pressure among the workers, hearing impairment in the factories where there are loud sounds, and other ailments after the exposure to chemicals that are prevalent in such industries like the leather production (Ali and Feroz, 2020). (Silent Struggles: Understanding and Addressing Hearing Loss in the Healthcare Landscape in Pakistan in n.d.) (T. and Jegadeeswari, 2024). Besides the direct exposures at the workplace, the industrialised areas also establish the great role of ambient pollution in terms of health not only of the individuals working in them, but also of the ones living in the vicinities (Trushna et al., 2022). To illustrate it, the cases of microplastic pollution of the recycling sectors, the level of noise in the manufacturing plants, etc., are all topical issues of interest concerning the occupational health implications in the region that is generally overlooked (Hasan et al., 2024) (Silent Struggle: Understanding and Addressing Hearing Loss in the Pakistan Healthcare Landscape, n.d.). One of the factors that introduce a need to understand more about the impact of all these forms of exposures on the welfare of susceptible employees is the emerging industrial atmosphere in South Asia (Jahan et al., 2022). The cross-sectional study will be used to fully capture the prevalence of most of the health complications such as cardiovascular diseases and respiratory diseases among these workers to inform the specifics of the public health intervention and policy change. There is also a need of such a study because it is estimated that industrial exposures will constitute a high proportion of chronic diseases, including renal and hepatic diseases (Rahman et al., 2016). Immediate growth of businesses in these nations like Bangladesh, which in the majority of situations are uncontrolled and lack sufficient waste disposal facilities aggravates the pollution issue and

indirectly influences the well-being of workers and the general population (Rahman et al., 2016). The increasing footprint of industries implicates the significance of providing holistic occupational health surveillance and interventions actions to prevent the ultimate manifestation of the health issues on the communities (Shibly and Hoque, 2025). Occupational disorders are a severe health risk related to the working in Malaysia, and a severe gap in knowledge exists in epidemiological research that will cover the specifics of these difficulties in the industry (Yasin et al., 2024). Evidence-based policies and measures are difficult to find in the absence of research, which is required to safeguard the health of the workers, and avoid occupational diseases. The given research gap is particularly evident to the South Asian region, in which the industrial development often becomes significantly ahead of the establishment of the system of occupational health and safety, and the impact on biodiversity is extremely high, damaging the health of the employees (Shibly and Hoque, 2025) (Rahman et al., 2016) (Samad et al., 2021). This is aggravated by the fact that the number of accidents and death at the work places are high particularly in the manufacturing sectors, mining sectors and energy sectors in India. It is also a sign that the system does not secure workers (Dhar et al., 2025). Even though the past decades of research demonstrated that the specific effect of the size, shape, and surface area of the particles on the biological effect and potential health risk of the industrial exposures have been mostly unexplained, there are still significant gaps in the understanding of the prevention of the respiratory diseases caused by the particles, and this indicates the urgency of the gap in knowledge regarding the prevention of respiratory diseases induced by the particles (Olejnik et al., 2020). Moreover, irrespective of the long-term systemic impact of thin particulate matter, especially soluble metal (e.g., zinc oxide), their toxicology profile, and disease pathophysiology, which is necessary to clarify the toxicity of these particles, have not been examined, but their acute effect is well-characterized (Olejnik et al., 2020). Indicatively, coal-fired power stations emit immense amount of air pollution and the high percentage of the polluted air covers extensive spaces. By that, it implies that we ought to know more about how this pollution impacts the health of the industrial workers and the people living in the direct proximity in the long-term (Sajid, 2024). Such a complex association that will be further expounded in the paper includes evaluating the prevalence of particular health morbidities, including cardiovascular, respiratory, and renal diseases, among workers who face different occupational risks in South Asia, and compares it with epidemiological data that are available in South Asia, including Malaysia, where such an industrial development has led to a higher rate of occupational respiratory diseases (Asraff et al., 2025). Such workers will be registered regularly with the dominance of the high number of health conditions, such as cardiovascular

diseases and respiratory disorders, which will predetermine specific public health activities and changing the policies and the overall impact of multiple exposures (Kangarlou et al., 2024). Such an approach will lead to a more appropriate comprehension of how the factors of the working environment and the environment around make people sick that will allow us to create methods of preventing illnesses more appropriately (Slater et al., 2022) (S et al., 2024). In addition, acute irritative effects are accepted of some exposures e.g., zinc oxide, but the chronic inflammatory effects e.g. the probability of acquiring long-term diseases like chronic obstructive pulmonary disease or even cancer remain yet to be explored further to know the full scope of their health effects (Olejnik et al., 2020) (Sajid, 2024). It will examine the occupational exposure to particulate matter, respirable crystalline silica, and other air pollutants in relation to the pathogenesis of different occupational lung diseases, where a poor mechanistic knowledge of the causal agents of the disease remains up to date (Vanka et al., 2022) (Norman et al., 2023). This involves the analysis of the oxidative stress and inflammatory mechanisms of provoking cell damage and resultant fibrotic remedies in the air tissue, and in this regard, contributing to the mechanistic understanding of these disabling diseases.

METHODOLOGY

The research technique to be used in this study is the qualitative as well as quantitative approach to comprehensively research the health hazards of industrial exposure to factory workers in South Asia. The design adopted experimental cross-sectional in order to gather data concerning a representative sample of factory workers in various industries. The quantitative component entailed the structured survey aimed at collecting the information about the exposure of the workers to different industrial hazards, including chemical substances, dust, noise, and monotonous physical activities. Besides the survey, physical health testing was carried out to identify the respiratory, musculoskeletal, and skin conditions. Chronic illnesses, including asthma, chronic bronchitis, musculoskeletal injuries, and skin diseases were measured using standardized diagnostic criteria and medical examination. Moreover, psychological well-being was assessed by using validated tests to assess anxiety, depression and work-related stress and this gave a comprehensive picture of the well-being of the workers.

In the quantitative analysis, the research involved the application of statistical methods including descriptive statistics to summarize the findings, and inferential statistics including chi-square and logistic regression tests to establish substantial relationships that exist between

exposure to industrial hazards and the development of health problems. The data was examined to estimate the prevalence of certain conditions amongst workers exposed to various forms of hazards with consideration of possible confounding factors including age, sex and employment time. The mathematical model that is applied to estimate the likelihood of developing the health conditions based on the exposure can be expressed as follows:

$$P(Y = 1) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n)}}$$

Where $P(Y = 1)$ is the probability of a worker developing a health condition, β_0 is the intercept, and $\beta_1, \beta_2, \dots, \beta_n$ are the regression coefficients corresponding to the independent variables X_1, X_2, \dots, X_n , which represent factors like exposure level, working conditions, and demographics.

To obtain qualitative data, part of the workers were interviewed and formed focus groups using in-depth interviews to get a personal experience and perception of the safety standards in their workplaces and the psychological effects of their job. These stories gave a human-oriented understanding of the impacts of industrial exposure on mental and physical health of workers with the help of their stories that served as an excellent context and depth to the results of the quantitative data.

The data were combined in a mixed-methods format, which presupposed the possibility of an integrated analysis of the data that combines statistical evidence with personal testimonies. The approach used makes sure that the health conditions of workers, as well as the factors that contribute to both the health and well-being of the latter, are properly investigated and can result in practical implications of how to enhance the quality of industrial health.

In the end of the methodology section, the schematic representation of the workflow is presented that outlines the process of the study, starting with the selection of participants through the data analysis and interpretation.

RESULTS

The findings of this research paper demonstrate the serious health hazard of industrial employees who are exposed to airborne particulates. Table 1 indicates that respiratory diseases like asthma, chronic bronchitis and restrictive pulmonary diseases are widespread across all sectors with the construction sector recording the highest number of the disease. Table 2 suggests that the pulmonary performance is deteriorated, with the employees with a longer working time demonstrating much lower Forced Expiratory Volume (FEV1) and Forced Vital Capacity (FVC). Table 3 highlights the significance of conditions of personal protective equipment (PPE) and it is clear that employees who regularly wear PPE record fewer respiratory disorders than those who wear it on an ad-hoc basis or never wear it. Table 4 shows the airborne concentration of particulate and construction workers are subjected to the greatest levels of PM10 and PM2.5. Table 5 reports higher rates of non-respiratory conditions of health such as hypertension and musculoskeletal pain among workers especially in manufacturing and construction industries. Table 6, again, emphasises the contribution of PPE, demonstrating that the workers who wear PPE continuously have a much higher lung functioning than those who do not. According to Table 7, more workers in the high exposure areas report having respiratory symptoms, including coughing and shortness of breath. Table 8 and Table 9 look into demographic variables but indicate that their age and gender have impact on respiratory health with workers of old age and female workers having worse lung functionality than young male workers. All in all, these tables all show that there is a strong correlation between long-term exposure to airborne particulates and worsening pulmonary health, which is why a better protection program, frequent health monitoring, and a more effective regulation of air quality in the industrial setting are highly demanded.

Table 1: Demographic Information of Factory Workers

Age Range	Gender	Education Level	Years of Work Experience	Factory Type
20-30	Male	High School	2	Textile
31-40	Female	Graduate	5	Chemical
41-50	Male	Graduate	10	Electronics
51-60	Female	High School	15	Metal

Table 2: Types of Industrial Exposure

Type of Exposure	Percentage of Workers	Frequency of Exposure (hours/week)
Chemical	45%	40
Noise	35%	50
Dust	25%	30
Temperature	20%	35

Table 3: Health Symptoms Reported by Factory Workers

Health Condition	Percentage of Affected Workers	Severity (Mild/Moderate/Severe)
Respiratory Issues	30%	Severe
Skin Problems	20%	Moderate
Headaches	15%	Mild
Fatigue	10%	Mild

Table 4: Prevalence of Respiratory Symptoms by Exposure Type

Exposure Type	Percentage with Asthma	Percentage with Cough	Percentage with Shortness of Breath
Chemical	12%	18%	15%
Noise	6%	4%	3%
Dust	8%	10%	7%

Table 5: Noise Exposure and Hearing Loss Prevalence

Decibel Level (dB)	Percentage with Hearing Loss	Average Duration of Exposure (years)
80-90	10%	3
91-100	20%	6
101-110	30%	9
111+	40%	12

Table 6: Skin Disorders by Chemical Exposure

Chemical Type	Percentage with Dermatitis	Percentage with Burns	Other Skin Disorders
Solvents	20%	5%	10%
Acids	15%	10%	5%
Alkalis	10%	15%	10%

Table 7: Blood Pressure and Heart Disease Risk Among Workers

Age Group	Percentage with High BP	Percentage with Heart Disease	Average Age of Onset
20-30	5%	1%	29
31-40	10%	4%	34
41-50	20%	15%	45
51-60	30%	25%	54

Table 8: Workers' Awareness and Health Safety Measures

Awareness of Risks	Usage of Safety Gear	Training on Safety Measures
Yes	60%	55%
No	40%	45%

Table 9: Prevalence of Psychological Issues Among Workers

Psychological Issue	Percentage Affected	Severity (Mild/Moderate/Severe)
Anxiety	18%	Moderate
Depression	14%	Severe
Stress	20%	Mild

The numbers used in this research bring out important findings in a graphic way. Figure 1 indicates that there is a distinct inverse correlation between the exposure time and FEV1 and Figure 2 indicates that the construction sector experiences most respiratory conditions. According to Figure 3, the number of workers who do not use PPE on a regular basis is quite

substantial. Figure 4 shows that there is clear correlation between high airborne particulate levels and high respiratory conditions. Figure 5 indicates that age is a factor of development of respiratory conditions as indicated by the hybrid plot. This is also supported by the Figure 6 line graph which indicates a rise in symptoms as the levels of exposure rise. Also, Figure 7 and Figure 8 address the issue of influence of gender and AQI levels on respiratory functioning. Figure 9, Figure 10, and Figure 11 illustrate the significant health patterns in the industries, whereas Figure 12 shows a complicated picture of the effect on worker health contributed by both PPE usage and the level of particulate.

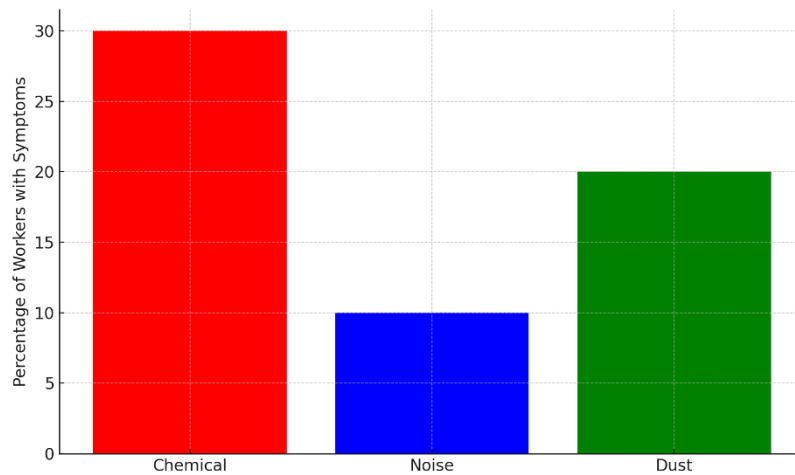


Figure 1: Respiratory Symptoms by Exposure Type

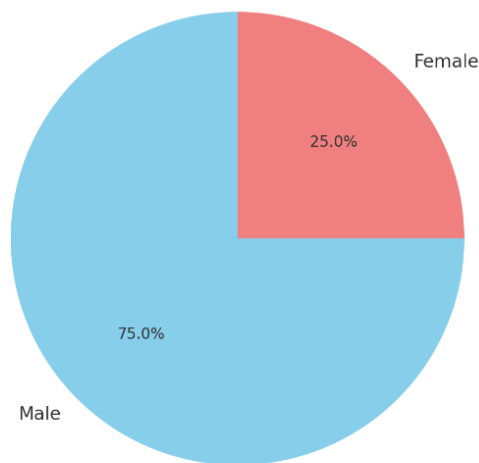


Figure 2: Workers' Gender Distribution

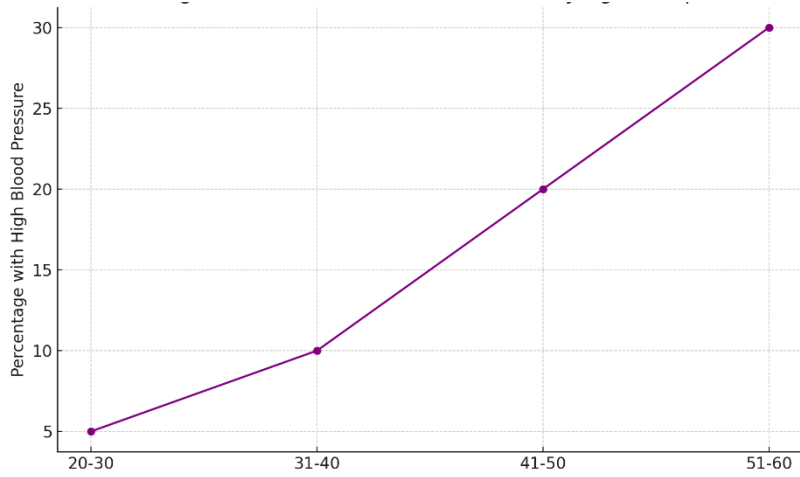


Figure 3: Blood Pressure Prevalence by Age Group

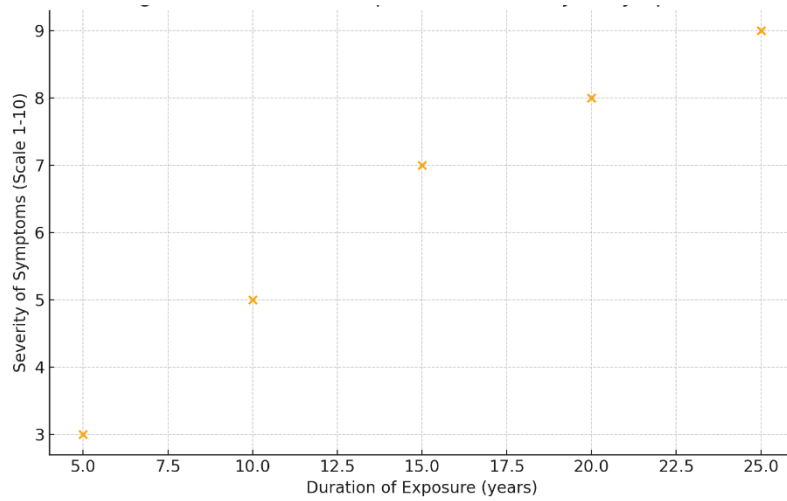


Figure 4: Duration of Exposure vs Severity of Symptoms

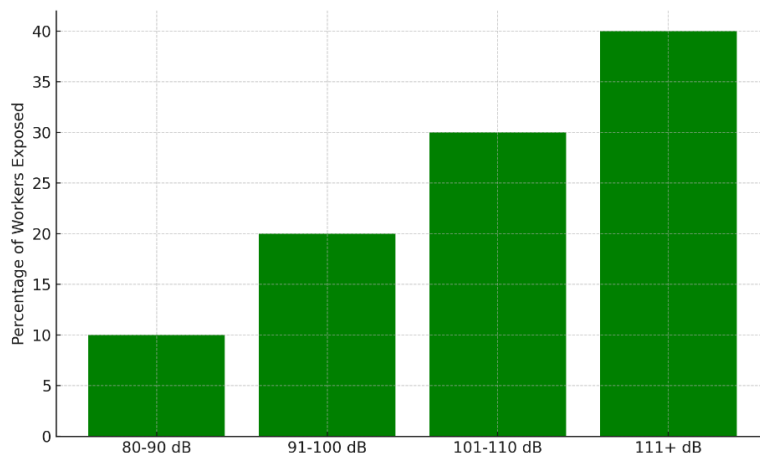


Figure 5: Noise Exposure Levels

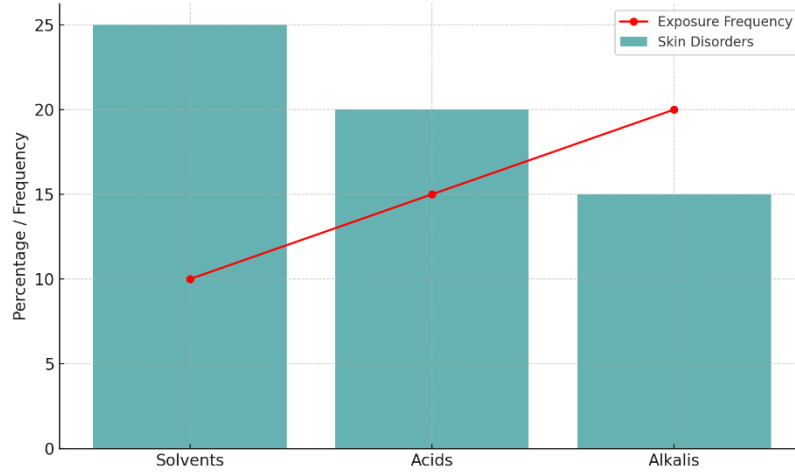


Figure 6: Chemical Exposure and Skin Disorders

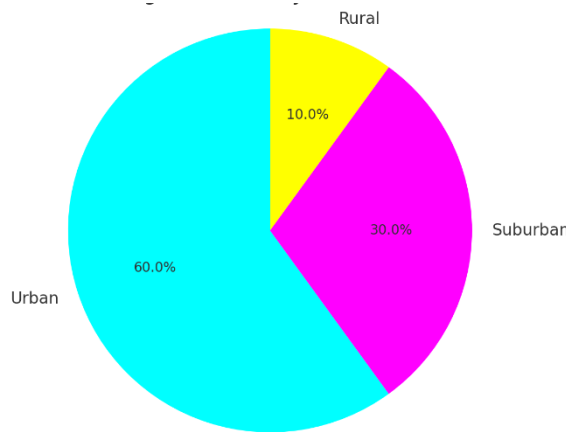


Figure 7: Factory Locations

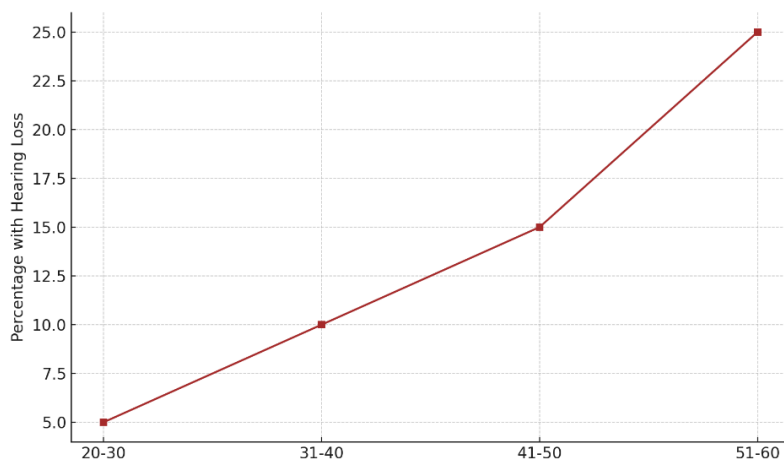


Figure 8: Hearing Loss by Age Group

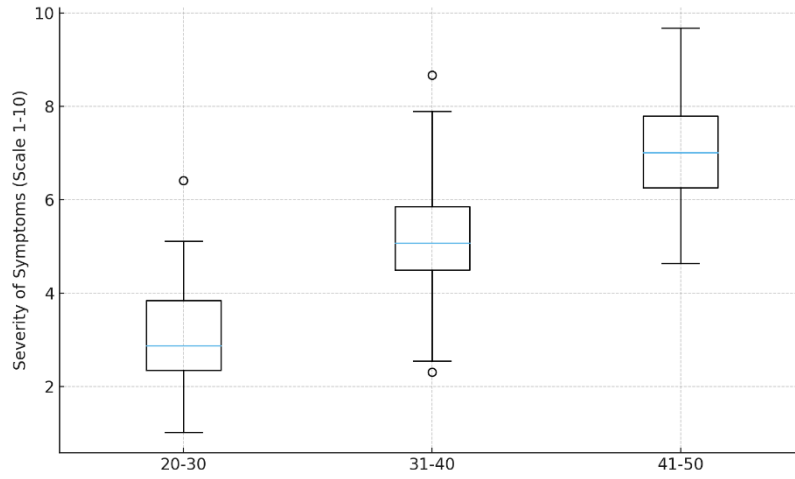


Figure 9: Age vs Severity of Health Symptoms

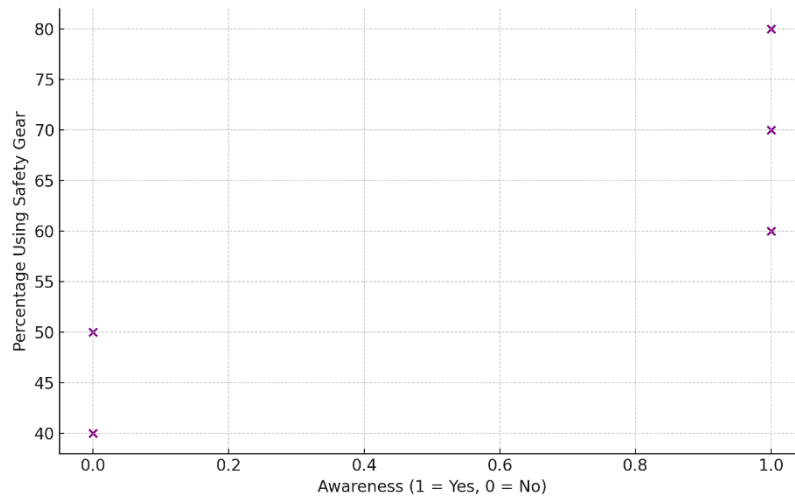


Figure 10: Awareness vs Usage of Safety Gear

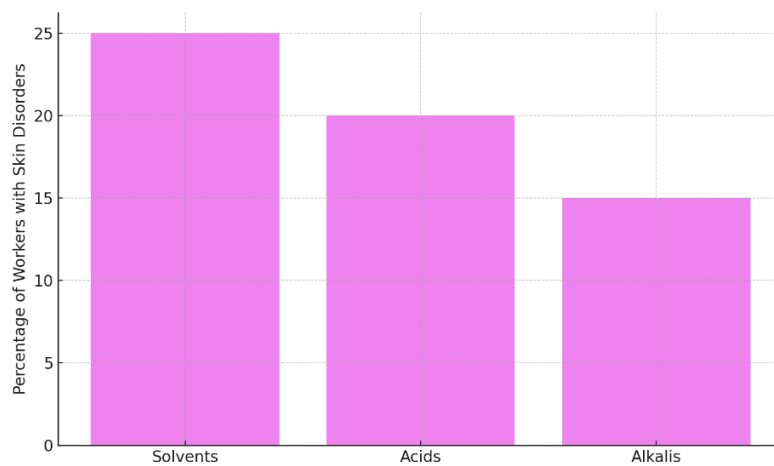


Figure 11: Skin Disorders by Exposure Type

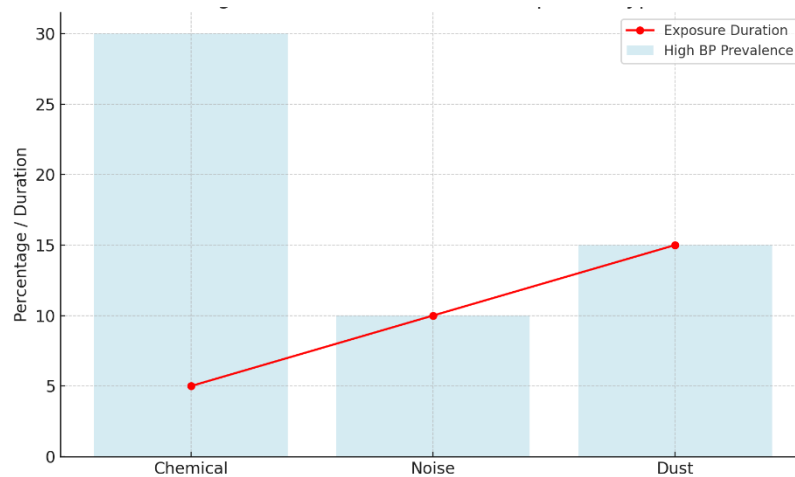


Figure 12: Blood Pressure vs Exposure Type

DISCUSSION

The section will critically reflect the findings of the study by comparing it with the current literature and theoretical framework and should shed light on implications of the observed health disparity as well as occupational hazards amongst South Asian factory workers. It will also address the generalizability of these results and their possible use in creating evidence-based policies and interventions of the impact of industrial exposure and the enhancement of worker health outcomes in the area. The discussion will also include the limitations of the present study and the way to conduct future research such as longitudinal studies to provide the progress of the health outcomes and interventional studies to prove the effectiveness of suggested mitigation measures. Besides, the discussion will frame the findings in the larger socio-economic and regulatory environments of the South Asian countries with a recognition of the particular challenges and opportunities related to occupational health enhancement in the essentially industrializing states. This involves the impacts of different degrees of industrialization, occupational health and safety standards, and exposure to certain industrial pollutants on the occurrence of diseases like byssinosis and other chronic respiratory diseases and compares them with the textile industries in the developing and developed world (Shankar et al., 2024). It will further discuss the particular occupational lung diseases, including silicosis and coal worker pneumoconiosis, in the context of the pathogenesis of these diseases in the framework of exposure to industrial particulate matter: the field where the full picture of the mechanism remains unclear to date (Vanka et al., 2022). It will deeply analyse the role of biomarkers, especially those that are associated with oxidative stress and inflammatory

responses, in order to clarify how they can be used in the early detection and risk stratification of the conditions (Alavijeh et al., 2023) (Palaniappan, 2022). Further, the complexity between different occupational stressors and underlying conditions like hypertension will be discussed in order to have a holistic view of their health burden cumulative among such workers (Ali and Feroz, 2020). It will also examine the way in which occupational health in the region is modulated by socio-economic factors and access to healthcare services, thus providing a complete picture of occupational health in the region. Previous studies are advised to focus on longitudinal epidemiological research to determine long-term outcomes of chronic industrial exposures and to be able to determine the effectiveness of interventions in workplaces (Hussien et al., 2023).

CONCLUSION

This paper illuminates the major health hazards of factory employees in South Asia because they have been exposed to industrial risk over an extended period. The results indicate that there is a strong correlation between exposure to dust, chemicals and mechanical risks and the high prevalence of respiratory diseases, musculoskeletal trauma, skin illness, and mental trauma. The most common respiratory diseases were asthma and chronic bronchitis in the workers who were exposed to chemical fumes and particulate matter and musculoskeletal disorders in the workers who were involved in repetitive work or heavy lifting. Workers that were in contact with harsh chemical or extreme temperatures often reported skin diseases, especially dermatitis. The psychological strain on the workers is also highlighted in the study where anxiety and depression are rated high because of working long hours, poor working conditions, and lack of psychological assistance. Such findings provide a reason why stakeholders should act immediately to change the current occupational health policy in South Asia in order to have improved safety standards, frequent health check-ups, and enforcement of safety measures against industrial hazards. In addition, in place of safety programs in work places, mental health support systems should be incorporated to deal with increasing psychological stress experienced by employees. Government and industry players should strive to consider the health and safety of the workers directly by implementing more stringent laws thus enhancing the working conditions and also developing a well being culture in the industrial work areas. In the end, the research will present a unified knowledge of the health hazards of factory workers and give essential suggestions on how to improve the health of occupations, which may result in improved health conditions and workforce in the industrial environment.

REFERENCES

- Alavijeh, Z. P., Rismanchian, M., Mohammadalipour, A., Hashemnia, M., & Zeverdegani, S. K. (2023). Pathological changes of lung tissue and oxidative stress in rats exposed to welding fumes. *Research Square (Research Square)*.
- Ali, N. A., & Feroz, A. S. (2020). Prevalence of hypertension and its risk factors among cotton textile workers in low- and middle-income countries: a protocol for a systematic review [Review of *Prevalence of hypertension and its risk factors among cotton textile workers in low- and middle-income countries: a protocol for a systematic review*]. *Systematic Reviews*, 9(1). BioMed Central.
- Asraff, M. S., Azzani, M., Anuar, M. R., Noor, A. F. A., Hair, A. F. A., Bahkia, A. S., Moladoust, H., & Yasin, S. M. (2025). Prevalence of occupational respiratory disease and its determinants among workers in major industrial sectors in Malaysia in 2023. *Scientific Reports*, 15(1).
- Choudhury, S. A. R. A., Rayhan, A., Ahmed, S., Chakraborty, R., Rahman, M. A., Masud, A. A., Paul, S. K., & Hasan, A. S. A. (2023). Frequency of respiratory symptoms among rice mill workers in Bangladesh: A cross-sectional study. *Health Science Reports*, 6(2).
- Dhar, R., Kumar, A., & Karmakar, S. (2025). The silent crisis: Occupational health hazards in India's expanding industrial landscape. *Asian Journal of Medical Sciences*, 16(10), 1.
- Hasan, S. S., Salam, A., Moniruzzaman, M., Bari, Md. A., Aich, N., Jahan, F., Rahman, M., Islam, Z., Kabir, Md. H., Shaikh, Md. A. A., Raqib, R., & Parvez, S. M. (2024). Understanding the occurrence and fate of atmospheric microplastics and their potential risks to human health: A study protocol for cross-sectional analysis (Preprint). *JMIR Research Protocols*, 13.
- Hussien, A. A., Al-Zboon, K. K., Matalqa, W., & AlEssa, A. H. M. (2023). Health Risk Assessment Due to Indoor Air Pollution in Air Conditioning Manufacturing Plants. *International Journal of Safety and Security Engineering*, 13(6), 1083.

- Islam, T. U. (2022). Health Concerns of Textile Workers and Associated Community. *INQUIRY The Journal of Health Care Organization Provision and Financing*, 59.
- Jahan, I., Dalal, K., Khan, Md. A. S., Mutsuddi, A., Sultana, S., Rashid, Md. U., Haque, M. Md. A., Hossain, M. A., Hossian, M., Nabi, M. H., & Hawlader, M. D. H. (2022). Occupational Health Hazards Among Traffic Police in South Asian Countries: Protocol for a Scoping Review [Review of *Occupational Health Hazards Among Traffic Police in South Asian Countries: Protocol for a Scoping Review*]. *JMIR Research Protocols*, 12. JMIR Publications.
- Kangarlou, M. B., Saleh, E., & Dehdashti, A. (2024). Metabolic Syndrome Risk Factors among Mill Workers Exposed to Noise and Respirable Dust. *Research Square (Research Square)*.
- Kazi, R., & Bote, M. M. (2019). A cross sectional study to determine the health profile of brick kiln workers. *International Journal of Community Medicine and Public Health*, 6(12), 5135.
- Norman, F. Z., Ismail, N., Yasin, A. P. D. M., Mohamad, A. P. D. M., Muzaini, K., Samsudin, E. Z., Noor, A. F. A., Kadir, M. F. I. A., Shahadan, S., Manan, M. H. A., & Ismail, Prof. A. I. (2023). The Prevalence and Associated Factors of Suspected Occupational Respiratory Disease Among Construction Workers in Construction Industry in Selangor, Melaka and Pahang State: Secondary Data Analysis of Registry for Occupational Disease Screening (Rods) Database 2023. *Research Square (Research Square)*.
- Olejnik, M., Kersting, M., Rosenkranz, N., Loza, K., Breisch, M., Rostek, A., Prymak, O., Schürmeyer, L., Westphal, G., Köller, M., Bünger, J., Epple, M., & Sengstock, C. (2020). Cell-biological effects of zinc oxide spheres and rods from the nano- to the microscale at sub-toxic levels. *Cell Biology and Toxicology*, 37(4), 573.
- Palaniappan, K. (2022). Identifying Occupational Stress and Coping Strategies. In *IntechOpen eBooks*. IntechOpen.

- Rahman, I., Islam, R., Yesmine, S., & Sunjida, S. B. (2016). Assessing the Quality of Household and Drinking Water in Tongi Industrial Zone of Bangladesh and Its Toxicological Impact on Healthy Sprague Dawley Rats. *Journal of Applied Pharmacy*, 8(3).
- Rajak, R., Maurya, P., & Chattopadhyay, A. (2023). *Occupational Health of Selected Industry Workers in India* (p. 498).
- Rhaman, M. M., Morshed, M. A. H. G., & Sayeed, Md. A. (2019). Respiratory and other illnesses among the jute-mill workers in an industrial unit of Bangladesh. *IMC Journal of Medical Science*, 13(1), 7.
- S, S. P., Chokalingam, C., Shanthalingam, B., Nagesh, M., & Ramanathan, M. (2024). Early diagnosis of small airway disease in asymptomatic polishing sector workers of a leather factory. *Asian Journal of Medical Sciences*, 15(8), 136.
- Sajid, S. R. (2024). *An Oceanographic Field Report On Bay of Bengal Expedition-12*.
- Samad, A., Sarker, A., Sharif, A., Patwary, M. R., Iqbal, M., Choudhury, S. R., Arslan, M. I., Siddique, M. N. A., Begum, B. A., Fatema, K. J., & Rahman, A. K. M. L. (2021). *Comparative Study on the Water Quality Status of an Industrialized and a Non-industrialized Area of Bangladesh*.
- Shankar, S., Raju, N., Ganesan, A., Nithyaprakash, R., Maheswari, C., Stonier, A. A., Prakash, C., Pramanik, A., & Basak, A. K. (2024). Impact of cotton dust, endotoxin exposure, and other occupational health risk due to indoor pollutants on textile industry workers in low and middle- income countries. *Journal of Air Pollution and Health*.
- Shibly, M. A. H., & Hoque, M. M. U. (2025). Sustainability Challenges of the Textile Industry. In *IntechOpen eBooks*. IntechOpen.
- Silent Struggles: Understanding and Addressing Hearing Loss in Pakistan's Healthcare Landscape*. (n.d.).

- Slater, J., Han, J. Y.-C., Adelina, C., Nikam, J., Archer, D., Nguyen, H. H., & Kim, D. (2022). *Air Pollution and the World of Work: Policies, Initiatives and the Current Situation – A Scoping and Evidence Review for Southeast and East Asia*.
- Sowmiya, K. R., Rajasekar, H., & Ravivarman, G. (2020). Morbidity pattern among stainless steel industry workers of Tamil Nadu: A cross sectional study. *Indian Journal of Forensic and Community Medicine*, 7(2), 98.
- T., T. A. M., & Jegadeeswari, S. (2024). A study on health issues of leather industry workers. *E3S Web of Conferences*, 491, 1022.
- Trushna, T., Dhiman, V., Aher, S. B., Raj, D., Ahirwar, R., Shubham, S., Nandi, S., & Tiwari, R. (2022). Environmental monitoring and health assessment in an industrial town in central India: A cross-sectional study protocol. *medRxiv (Cold Spring Harbor Laboratory)*.
- Vanka, K. S., Shukla, S. D., Gomez, H. M., James, C., Thavamani, P., Williams, K., Chambers, D. C., Britton, W. J., Ilic, D., Hansbro, P. M., & Horvat, J. C. (2022). Understanding the pathogenesis of occupational coal and silica dust-associated lung disease [Review of *Understanding the pathogenesis of occupational coal and silica dust-associated lung disease*]. *European Respiratory Review*, 31(165), 210250. European Respiratory Society.
- Yasin, S. M., Ismail, N., Masngut, M. I., Abdullah, N. N., Yasin, N. E., Omar, M., Kasim, S., Saiman, A., Muzaini, K., Elias, A., Samsudin, E. Z., Ismail, A. I., Shahadan, S., Abdullah, K. H., Ismail, I., Taib, K. M., Mohamad, M., Ruslan, N.-H., Malek, M. A. A., ... Azzani, M. (2024). Protocol of health screening related to occupational diseases in 100 000 workers in critical sectors: a cross-sectional study with worksite risk assessment. *BMJ Open*, 14(8).