Innovations

Workplace, Health Risks and Safety Procedures for Tannery Employees in the Kanpur Dehat District, India

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Abstract: *Occupational health encompasses all elements of worker safety and well-being. The purpose of the study is to determine how much knowledge there is on the risks to one's health that come with working with leather and what precautions tanneries in rural Kanpur, India, have taken to mitigate those risks. Two hundred four (204) tannery workers from the study region were surveyed using questionnaires adapted from the European Community Respiratory Health Survey (ECRHS) and the Tasmanian Longitudinal Health research (TAHS) in order to collect data on occupational exposure and health outcomes. We examined the work areas of the employees (beam house, wet finishing, dry finishing, and miscellaneous) as well as their duration of employment. The results showed that employees who worked in both wet and dry finishing had more challenges.The length of employment and nature of the job are linked to a higher risk of health issues, such as respiratory disorders and skin conditions, in workers at tanneries. The study's findings show how the working environment affects employees' health and call for taking appropriate action to upgrade facilities and enhance employees' health in tanneries. To lower these dangers and enhance the health of tannery workers, strict regulations, ongoing enforcement of health evaluation, and labor and employer education are required.*

Keywords: *Tannery workers, Occupational exposure, Health complaints, Chromium.*

Introduction

The global value of leather and leather products is approximately US$1,007 billion, with 45.8% originating from developing countries (United Nations Industrial Development Organization, 2010; Masciana, 2015). In many of these countries, occupational health and safety (OHS) practices often fall short of the standards seen in more developed nations due to limited or underdeveloped laws and lax

enforcement of regulations (Fabriana et al., 2012; International Labour Organization, 2011; Rantanen et al., 2004). The leather industry is economically significant in countries like India, where high unemployment rates and low labor costs, coupled with relaxed safety and environmental regulations, make it an attractive sector for businesses (Fabriana et al., 2012b; Azom et al., 2012; Paul et al., 2013; Tinney et al., 2013). The tanning sector plays a crucial role in India's export-driven economy. However, the lack of basic environmental protection measures presents a serious threat to public health and the sustainability of natural resources (Bhowmick, 2012). Various stakeholders, including buyers, international rights organizations, environmental activists, and local communities, continuously urge the government to implement environmentally friendly manufacturing processes in the leather industry (Bhowmick, 2012).

Tannery Conditions in India

In the context of Indian industry, the leather, economy goods, and consumer goods sectors are crucial. This sector plays a significant role in the economy, benefiting from India's large population. In 2020-21, India produced leather goods worth $3.68 billion, including shoes. The country has an ample supply of raw materials for this sector, as it possesses skilled workers and houses 20% of the world's goats, making it a major player in leather production. The global business goods market was estimated to be worth $440.64 billion in 2022 and is expected to grow at a compound annual growth rate (CAGR) of 6.7%, reaching $738.61 billion by 2030. Europe leads the leather products industry with a market share of 37.72% in 2022. Approximately 4.42 million people work in related jobs, with women accounting for up to 30% of workers. India ranks fourth worldwide in leather goods production, contributing about 3% of the global leather products market. The primary markets for Indian leather and leather products include the United States, with a share of 23.77%, followed by Germany at 11.00%, the United Kingdom at 9.37%, Italy at 5.91%, and France at 5.72%. From April 2021 to March 2022, these 15 countries accounted for approximately 79.60% of India’s total leather and leather product exports, valued at $3,878.71 million.

Workers Health Condition

Ensuring the health and safety of leather tannery workers is a critical concern in nations that are developing, especially in India. These personnel face various health risks because to their frequent exposure to toxic substances and activities. While handling raw materials by hand exposes workers to high concentrations of bacteria and boosts their risk of illness, tanning chemicals can cause discomfort and sensitivity. It is alarming how common respiratory problems, skin conditions such as jaundice, and work-related injuries are among tannery workers.We strongly

recommend immediate implementation of security instruction and the use of the appropriate personal protective gear (PPE), such as face masks, caps, aprons, gloves, safety glasses, and gumboots, to address these problems. By taking these steps, employers will reduce the danger of exposure at work in leather tanneries and provide employees with the necessary abilities to empower themselves. In addition, in light of our study's findings, we support a thorough strategy that calls for periodic health monitoring and task revaluation for this high-risk population. These preventive measures are essential for tannery workers in nations that are developing to avoid health issues and keep secure working environments.

Study Region

Kanpur Dehat district is situated in the western part of the Indian state of Uttar Pradesh and is a part of the Kanpur Division. It extends from 26°06'30" north latitude to 26°50'15" north latitude and 79°30'00" east longitude to 81°10'15" east longitude. The district shares its borders with several other districts including Kanpur Nagar, Farrukhabad, Etawah, and Auraiya. The terrain of the district is mostly flat, which makes it suitable for agriculture, and it is surrounded by rivers such as the Yamuna and Pandu. The district is divided into two subdivisions: Akbarpur and Rasulabad, with Akbarpur serving as the administrative headquarters. Kanpur Dehat is further divided into smaller blocks and tehsils for governance and development purposes. It reflects the rural and historical essence of Uttar Pradesh while making steady progress in various aspects such as education, infrastructure, and governance.

Objectives

- To assess the existing safety measures and precautions in tanneries and identify gaps in workplace practices that contribute to occupational health risks.
- To evaluate the impact of job roles and employment duration on the prevalence of health issues and to identify the effectiveness of current safety measures in mitigating these risks.

Database and Methodology

The study took place in the ten largest tanneries in the Kanpur Dehat District of Uttar Pradesh between March and July 2024. These tanneries were randomly selected to represent the research area. The ten tanneries provided a list of their employees, including their number and area of responsibility (converting raw leather into finished leather). From this list, 204 full-time employees who were involved in the tannery's production or processing operations and were at least 16 years old were randomly chosen. Given that there are approximately 4,090 tannery industrial workers in the region, selecting 5% of the total workforce (204 workers) allows for a

statistically significant sample that reflects the socio-economic conditions, working environment, and health challenges faced by workers in the area. Employees from non-manufacturing or non-processing departments with administrative roles were not included. Each selected employee had worked in the tannery for at least two years and was involved in leather tanning. The participants' educational backgrounds were divided into four categories: illiterate (no schooling), primary school (up to five years), secondary school (six to twelve years), and graduate school (more than twelve years). The housing status of the participants was categorized as building, tin shedding house (with mud or brick walls, mud or brick floor, tin roof), kutcha house (traditional village house built of mud, bamboo, wood, or straw with mud floor), or pukka house. Respondents' monthly income was calculated by adding together their overtime and wage income. This method allowed for an in-depth understanding of the socio-economic conditions, health risks, and occupational safety concerns that industrial workers in Rania face, offering valuable insights into the challenges they encounter in their daily lives and workplaces.

Occupational exposure and health questionnaire:

Face-to-face interviews were used to gather data, and a standard, semi-structured questionnaire was used. The questionnaire, which was derived from the Tasmania Longitudinal Healthcare Survey (TAHS) (Matheson *et al*., 2016) and the European Community Lung Health Study (ECRHS) (Le Maul *et al*., 2014), asked questions with regard to occupational history and problems with breathing. Data has been collected regarding statistics, previous and present job duties, workplace accidents, awareness of and usage of safety gear (PPE), and length of employment. The health questions covered lung and airway conditions, jaundice, and pressure in the chest, shortness of breath, and skin problems /itching.

Exposure measures:

The length of employment and the nature of labor in the tanning industry were determinants of self-reported exposure. The entire number of years spent working in the tannery sector was used to define the duration of employment, which was gathered continuously. The four exposure groups beam house, wet completing, dry finishing, and miscellaneous that the majority matched the workers' everyday activities were used to describe the different work types.

Result and Discussion

Of the 204 workers invited to participate, the overwhelming majority (96%) were men with a mean age of 30 years. The educational background of the workers was diverse, with 48.52% having completed primary schooling and 23.03% having

completed secondary schooling. On average, workers had been employed for 6 years, and their average monthly income was Rs 7,000. The majority of workers (55.39%) worked 8 to 10 hours a day, and the smoking rate was 61.27%. Additionally, 64.70% of workers lived in tin shed houses, while 42.15% lived in concrete houses. The proportion of complaints was striking similarities between the four distinct work classes, with over 64.70% of workers reporting breathing issues in wet and dry finishing, about 66.66% reporting skin diseases in beam houses, and about 65.68% reporting serious injuries at the workplace. These statistics highlight the critical need for intrusions to increase the living and working conditions of workers.

Table-1: Socio-economic Characteristics and Respondents' Background

Variables	Description	Frequency	Percentage (%)
Educational status	Illiterate	12	5.88
	Primary education	99	48.52
	Secondary education	47	23.03
	Higher education	37	18.13
	Graduate	9	4.41
Worker designation	Labor	164	80.39%
	Boiler	17	8.33%
	Technician	23	11.27%
Type of house	Pucca	86	42.15
	Semi-pucca	132	64.70
Safety equipment	Mask	182	84.21
	Helmet	191	93.62
	Gloves	187	91.66
	Uniform	90	45.09
	Belt	92	44.11
Working hour	>8 hour	21	10.29
	8-10	113	55.39
	10-12	58	28.43
	<12	12	5.88
Monthly Income	>10000	137	67.15%

	10-12000	33	16.17%
	12-14000	18	8.82%
	<14000	12	7.84%
Smoking Status	Ever smoker	125	61.27%
	Never smoker	79	38.72%

Source: Based on Primary Survey 2024.

Working environment and working conditions

The efficiency of workers is affected by the environment of the industrial area they work in. To ensure that workers are comfortable, the working conditions should be suitable for their physical and mental well-being. This includes maintaining normal temperature, humidity, proper ventilation, light, and tolerable noise throughout most of the working hours. (Bulow and Summers 1986). Poor working conditions can make workers inactive, and physically and mentally reluctant to work. In addition, it can negatively impact their health. (Min and Lee 2019). For example, during a survey, it was found that 64.70% of workers were troubled by ventilation problems, while 60.29% had to work in unbearable heat. 60.78% of workers reported excessive noise from old machines, which was unbearable and affected their health. Moreover, 70.09% of workers reported that the chemicals used in the industry hurt their sense of smell. The study shows that working in a suffocating environment can reduce workers' will to live, and they may suffer from various types of diseases.

Table No. 2- Distribution of Respondent by physical work Environment in Industry

Environmental Factors	**Variables**	**Frequency**	**Percentage (%)**
Ventilation	Satisfactory	72	35.29
	Unsatisfactory	132	64.70
Heat	Too much	123	60.29
	Normal	81	39.70
Noise	Tolerable	67	32.84
	Intolerable	124	60.78
	No noise	13	6.37
Smell	Pleasant	18	8.82

	Un pleasant	143	70.09
	Injurious	43	21.07

Source: Field Survey 2024

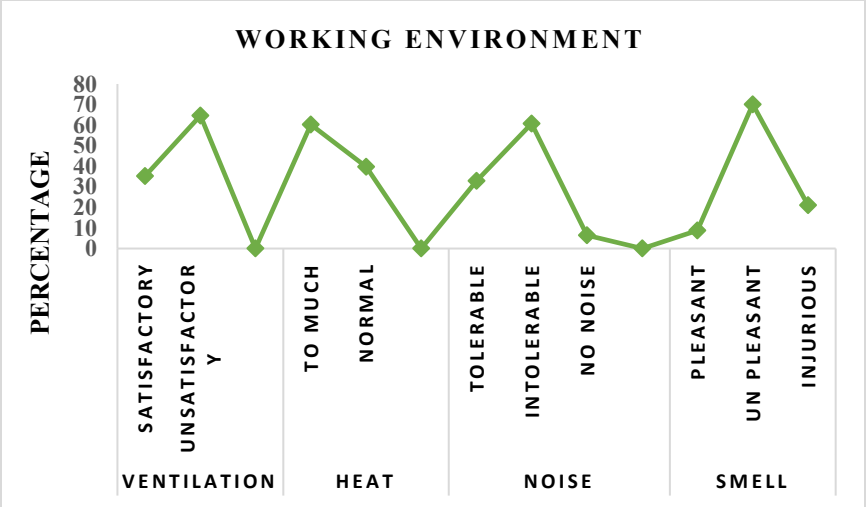

Fig.1 Working Environment

Distribution of Health Complaints:

According to the study, tannery workers were far more inclined to report health issues such as difficulty breathing, skin conditions, yellowing of the skin and previous experiences of accidents at work. Additionally, we discovered that difficulty breathing was related to the type of work and the length of employment. Furthermore, we discovered an increased incidence of skin diseases among beam house workers. Additionally, this survey revealed that among tannery workers, a few common health concerns were more common. As an illustration, a cross-sectional study conducted in Ethiopia found that those with over 20 years of job experience had a 2-fold increased risk of asthma compared to those having 1 to 5 years of experience (Merga, 2018). According to Shahzad*et al*. (2006), a cross-sectional study conducted in Pakistan provided additional proof that laboring in a leather tanning plant for eight or thirteen years raised the chance of adult asthma by 2.26 and 3.67 times, respectively. Furthermore, an association was observed between the nature of the occupation and the incidence of respiratory problems. The risk of breathing problems was found to be 11.75 times higher for Tannery employees working in wet finishing and 13.38 time higher for those who work in the assorted group. Heavy metals including chromium [III], lead, copper, zinc, cadmium and iron, and nickel are included in these dusts, and prolonged exposure to metal dust might result in respiratory illnesses (Sarwar*et al*., 2018). We found that the nature of the work was linked to skin conditions, but there was no discernible correlation across the length of employment and these conditions. The fact that

workers in beam houses opened, laid, wet, trimmed, and gathered raw hides and leather created organic particles that could cause dermatitis, which further supported our finding that employment in beam houses was linked to skin diseases (Bujia*et al*., 2007). Conversely, the chemicals employed in the leather-making process change the composition of skins and leather. An Indian study found that workers in the tanning of leather sector had a 2.6-fold higher risk of skin illnesses when working with chemical agents (Ori *et al*., 1997). Workers in the dry finishing sector reported that there was an adverse association with skin conditions. Self-reported data are more vulnerable to recall bias, which could be the cause of this. We couldn't find a connection between the length of employment and the sorts of jobs and a history of hepatitis. While jaundice was observed by 61.76% of the participants, this could be because to chromium exposure from the manufacturing of leather goods, which could be linked to liver damage (Khan *et al*., 2013). Due to differences in study design, sample strategies, and exposure assessment, it is challenging to compare this conclusion with those of other investigations. The fact that data from employees who were interacting with hazardous products in the tanning industry was gathered is one of the study's strengths.

Self-reported health complaint		**Beam house(72)**	**Wet finishing(35)**	**Dry finishing(27)**	**Miscellaneous (70)**	**Total (204)**	**Percentage**
Breathing difficulty	**Yes**	50	22	19	41	64.70%	132
	No	22	13	8	29	35.29%	72
Skin diseases	**Yes**	55	20	12	49	66.66%	136
	No	17	15	15	21	33.33%	68
History of Jaundice	**Yes**	41	26	7	52	61.76%	126
	No	31	9	20	18	38.23%	78
Injuries at workplace	**Yes**	42	17	18	57	65.68%	134
	No	30	18	9	13	34.31%	70

Source: Based on Primary Survey 2024.

Table 3. Distribution of Health Complaints Stratified by the Types of Work (n = 204)

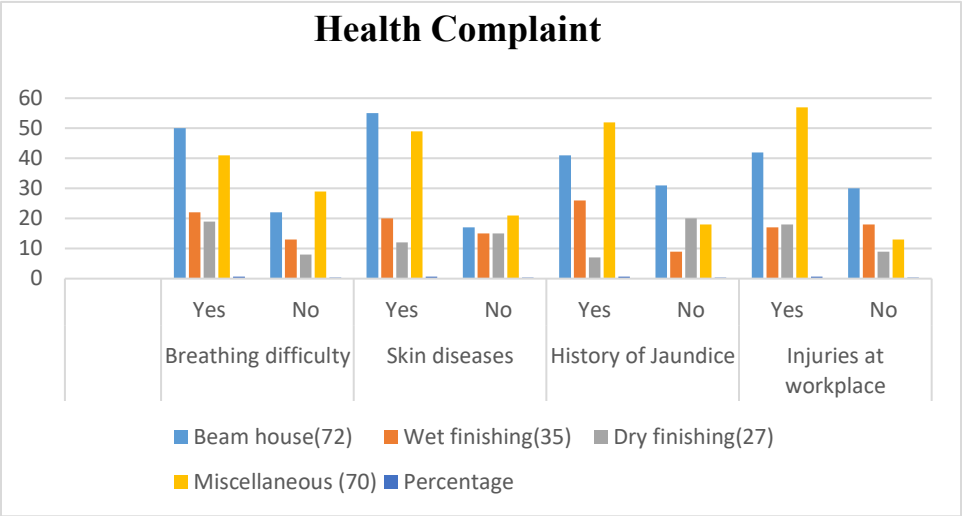

Fig.2 Health Complaint

Conclusion:

In India, the government has launched various schemes and facilities to support leather artisans, aimed at improving working conditions, providing financial assistance, skill upgrading, and promoting leather exports. Social Security Schemes: Many state governments offer insurance schemes such as health coverage and accident insurance for leather workers. Some states offer additional support for leather workers through rural employment schemes. Common Facility Centers. CFCs are set up to provide shared infrastructure, technology, and services in leather clusters, including testing laboratories, design centers, and training facilities. These initiatives have been taken to promote the leather sector and improve the livelihoods of people involved in the industry. However, during the survey, many problems were observed in the sector that are not covered under these schemes. Circulars and tannery owners should pay attention to noise reduction and ventilation systems to maintain the safety of employees and a healthy working environment. They should also ensure that workers have adequate gloves, masks, and eye protection. Regular health check-ups should be done to identify health problems early. It is necessary to provide training on equipment operation, emergency response, and safe chemical handling. Employees should receive training on the health risks related to their jobs as well as the importance of safety precautions and good hygiene. It is important to create policies that limit the working hours of employees and guarantee that they get adequate breaks. Health services should be

accessible to employees. Programs should be run for the mental health of employees. Implementation of waste disposal and treatment technologies is necessary to protect the environment from toxins released from factories. Ensure that all employees have access to sanitation facilities and clean drinking water. To promote a safe and healthy work environment, tannery owners, employees, government officials, and NGOs should work together to address these concerns.

The results of the study indicate that the study area is in a rural area and lacks modernization and necessities, which exposes tannery workers to health risks and works in a particularly hazardous workplace. Tannery workers have little knowledge about the health risks associated with tanneries as well as exposure to harmful chemicals at work. Qualitative measurements of environmental exposure indicate that they face altered risks and engage in different activities in the tannery. Moreover, the study findings indicate that tannery workers are not following the recommended protective measures. The survey conducted here specifies that even at the administrative level, officials and the government are unaware of the importance of worker safety. The youth are unemployed mainly due to the rural location, which forces them to work in factories at low wages and sometimes under appalling conditions. The government should make proper rules that guarantee a clean and safe workplace for the employees, fix working hours, pay them properly for overtime, and provide all the necessary safety equipment. And ensure that all workers have access to the essential safety gear. Also, the benefits that the government has issued for the workers across the country should be ensured that they are available to workers from every region of the country and the working class can also live a comfortable life.

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