

Health Issues of Tannery Workers at Savar, Dhaka, Bangladesh

¹Umme Habiba Bodrun Naher, ²Dr. Md. Humayun Kabir, ³Most. Laboni Begum, ⁴Md. Rayhan Sarker and ⁵Sirajum Munira

¹Assistant Professor, Institute of Leather Engineering and Technology, University of Dhaka

²Professor, Department of Geography and Environment, University of Dhaka

³Part-time Lecturer, Institute of Leather Engineering and Technology, University of Dhaka ⁴Lecturer, Institute of Leather Engineering and Technology, University of Dhaka

⁵Research Student

Institute of Leather Engineering and Technology, University of Dhaka, Dhaka, Bangladesh

Abstract: Leather industries in Bangladesh are considered as one of the most potential sectors in terms of foreign currency but at the same time it causes detrimental effects on the workers' health and the surrounding environment as well. This study employs both quantitative and qualitative (based on FGD, face to face interviews, key informant interviews and personal observation) method. This study investigates the prevalence and patterns of health problems of tannery workers at Savar, Dhaka. It reveals that male workers are more susceptible to health problem than female (p value 0.004). It also exhibits that 89.5% workers are suffering from skin problem and 89.5% from asthma. Other most common health problems of tannery workers are jaundice (71.8%), nail rotten problem (75.6%), chronic headache (66.5%), gastrointestinal problem (65.4%), ophthalmological diseases (62.8%), trauma (62%), cardiovascular disease (56%), hearing problem (55.6%), pain in joints (49.6%) and frequent fever (42.9%). Only 26.7% tannery workers who use PPE are less affected by health problems than the workers who do not use PPE (p value 0.002) in the workplace. There is a highly significant association between job duration and health problems of tannery workers (p value 0.002). Also there is an association between residence and health problems of tannery workers (p value 0.028). The workers stay in polluted environment in the tannery and live in unhygienic dwelling outside the industry and both create health problems to them. Due to direct exposure of toxic chemicals, dust, gas produced due to using of different chemicals, lack of safety measures, lack of solid and effluent management and unhealthy workplace condition (insufficient light, high level of noise etc.) are the driving factors behind health hazards to them.

This study infers the health status and safety practices of workers at tanneries in Bangladesh. Healthy tannery environment, training and better health care facilities to the workers can ensure better health status to them.

Key Words: Tannery, Asthma, Ophthalmological Disease, Personal Protective Equipment (PPE), Trauma.

I. INTRODUCTION: Though health is one of the basic rights for both men and women, most workers in Bangladesh's export-oriented leather industries suffer from utmost health hazards due to unsafe working conditions. Although Bangladesh has achieved remarkable progress in health and nutrition but in case of tannery workers' health status, it does not persist at satisfactory level [1]. The leather industry is considered one of the most hazardous industries in Bangladesh due to usages of different toxic chemicals and unhealthy working conditions [2, 3]. Tanning industries of Bangladesh produces huge amount of solid and liquid wastes to process the raw hides and skins into leather, contaminating the environment [4]. From one thousand-kilogram salted hides only two hundred fifty-five-kilogram finished leather could be found which means 25.5% of raw materials are converted to finished leather [5]. Different chemicals are used to convert hides/skins into leather which are potentially irritants and sensitizers to workers who are exposed to these for a long period [6]. The steps that are to be followed for the hides and skins to turn into leather are soaking, liming, deliming, bating, degreasing, pickling, tanning, neutralization, retanning, dyeing, fatliquoring and finishing [7]. Almost all chemicals used in these steps are one of the worst offenders of the environment. Untreated tannery effluent and directly discharged solid wastes into the environment are responsible for serious environmental threats which contain high amount of heavy metals namely Cr, Cu, As, Cd, Fe, Hg, Mn, Ni, Pb Zn [8]. Tannery effluent contain heavy pollution loads due to presence of azo-dyes, various organic and inorganic compounds, sodium chloride and sulphate that increase Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), Total Dissolved Solid (TDS), and Total Suspended Solids (TSS) [9]. Chrome tanning is widely used for leather processing which uses Basic Chromium Sulphate (BCS) of Cr (III); it is used in about 90% of tanneries in Bangladesh [10]. Long exposure to Cr (III) renders the risk of ulcers, dermatitis, respiratory illness, perforation of nasal septum and nasal cancer [11]. Moreover, the conversion of Cr (III) to Cr (VI) is very harmful that may be occurred due to oxidation of Cr (III). Cr (VI) has carcinogenic effect on human health which has also genotoxic and mutagenic effects [12]. Skin and respiratory diseases are very common health problems among tannery workers due to the exposure of toxic chemicals [13]. Some investigators have showed that leather industries are responsible for the development of variety of specific cancers including lung bladder, kidney, pancreatic, oral cavity, nasal and soft tissue sarcoma and skin along with dermatitis, ulcers, perforation of the nasal septum, respiratory illness [14-16]. Bladder cancer is associated with those working in tanning and liming, dyeing (especially dyeing with benzidine-based dyes) and finishing operation [17, 18]. Tanners exposed to dimethyl formamide (DMF), a finishing chemical, is known to cause testicular damage [19-20]. Not only tanning chemicals but also unskilled labor and lacking of personal protective equipment (PPE) practice also cause problems on human health in leather industry [21]. Work within the tannery itself is fraught with dangers-often with the result of inadequate or non-existent worker protections. These includes slips and falls on improperly drained floors; exposure to lime, tanning liquor, acids, bases, solvents, disinfectants and other noxious chemicals; injury from heavy machinery or flaying knives; drowning being boiled alive or buried in lime, all are terrifyingly

real hazards [22]. The health and safety of all employees is closely linked to the company's productivity in all workplaces [23]. In tannery, it is imperative to practice of OHAS (Occupational Health and Safety), otherwise it will create health hazard for workers who are directly involved with production [24].

II. RESEARCH METHODOLOGY

2.1 Study area, sample size and sampling method

A cross-sectional study has been conducted in a period from June to October 2019 among 266 respondents of 20 randomly selected tanneries who are working in tanneries at Savar, Dhaka. Simple random sampling of probability sampling is followed to conduct the study.

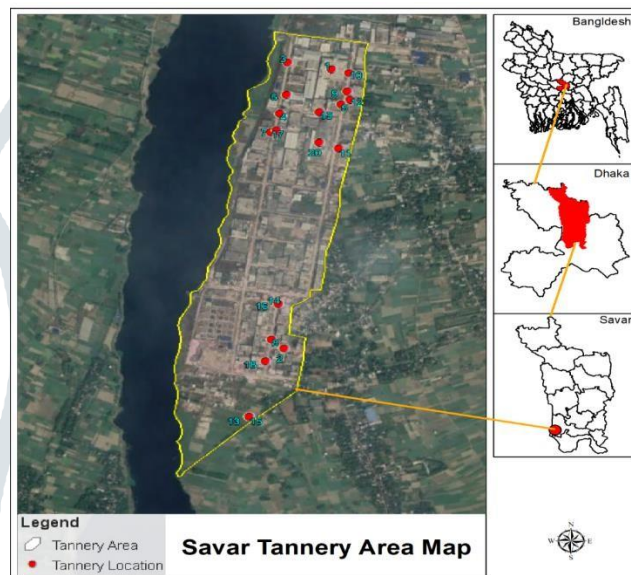


Figure 2.1: Map of the study area showing tannery locations

2.2 Data collection

Data and information have been collected through personal interview, focus group discussion, key informants interviews and personal observation.

2.2.1. Personal Interview and Questionnaire

For data collection, a standardized structured and comprehensive close-ended questionnaire is used. Face-to-face interview method is done to administer the questionnaire. 266 tannery workers with all ages (both male and female) have been interviewed individually. Of them 208 are male and 58 are female. Questions included in questionnaire are about workers age, sex, use of personal protective equipment, working hours, length of tannery job, training status, smoking status, knowledge regarding chemicals, working environment quality (ventilation, lighting, temperature, noise, smell), health outcomes and treatment situation of the tannery workers. Health outcomes are evaluated by asking some disease symptom questions.

For maximum questions, the workers have to answer yes or no.

2.2.2 Focus Group Discussion (FGD)

Eight Focus Group Discussions (4 male, 3 female and one child worker groups) have been conducted each of which has contained six participants. The discussion is guided by twelve (12) semi-structured open-ended questions and allows participants to respond in their own words on health related issues, working environment, management and policies regarding the problem to overcome. All the sessions are tape recorded and transcribed verbatim.

2.2.3 Key Informant Interviews

For this research, Key informants (tannery owner, leather technologist, official of Tannery Workers Association, official of Bangladesh Tanners Association (BTA), official of Department of Environment (DoE) of Bangladesh, official of BSCIC, inhabitant of nearby tannery area) have been asked mainly the policy and regulations for the well-being of tannery workers.

2.2.4 Personal Observation: The researcher has physically visited and observed the activities of tannery workers, how they do their work and their working environment.

2.3 Data analysis

For quantitative analysis, some statistics like mean, percentage and standard deviations are calculated to explain the personal characteristics of the respondents. Statistical analyses have been done by using Statistical Package for Social Sciences (SPSS, version 23) software, Microsoft Word and Microsoft excel (version 2010). T-test, logistic regression and chi-square test are done for analyzing the association of the risk factors like age, gender, educational level, lack of proper use of personal protective equipment, duration of work with the prevalence of different health problems among the tannery workers. The association is considered significant when p-value is ≤ 0.05 . Odds ratio (OR) is calculated to interpret Relative risk when Confidence Interval (CI) is considered 90%.

2.4 Research Ethics

Before conducting of the interview, the respondents are informed about their full right to participate or refuse to participate in the study and are ensured of being anonymous.

III. Results and Discussions:

Demographics characteristics of the tannery workers:

The demographic characteristics of the tannery workers at Savar are explained by the age structure, gender, education, daily working hours, monthly working hours, residence, job duration, smoking status etc.

Table 3.1: Demographics characteristics of the tannery workers

Characteristics	Category	No. of respondents (N= 266)	Percentage (%)
Gender	Male	208	78.2
	Female	58	21.8
Age (Year)	<18	19	7.1
	18-30	121	45.5
	31-40	92	34.6
	>40	34	12.8
Education	No education	75	28.2
	Primary incomplete	71	26.7
	Primary complete	77	28.9
	Secondary incomplete	42	15.8
	Secondary complete or higher	1	0.4
Daily working hours	8-10	10	3.8
	>10	256	96.2
Monthly working hours	240-250	8	3.0
	251-260	138	51.9
	261-270	75	28.2
	271-280	45	16.9
Residence	Hazaribagh	129	48.5
	Hemayetpur	137	51.5
Length of time (year) residing in that place	Hazaribagh for <5 years	61	22.93
	Hazaribagh for >5 years	68	25.57
	Hemayetpur for <5 years	137	51.50
Job Duration (Year)	<5	157	59.0
	6-10	38	14.3
	>10	71	26.7
Smoking status	Yes	208	78.20

	No	58	21.80
Having written agreement related to job	Yes	0	0
	No	266	100.0

Table 3.1 represents the socio-demographic characteristics of the respondents. Among 266 respondents 208 (78.2%) are male 58 (21.8%) are female. The study shows that 7.1% child labour are in the tannery which is the violation of Bangladesh's labour law. The children represent a cheaper source of labour. Most of the workers are young adult (45.5%) aged between 18-30 years. The data also shows that 28.2% respondents have no academic education, 26.7% do not complete their primary education and 28.9% complete their primary education. 96.2% workers are found working in the tannery more than 10 hours daily. The study reveals that job duration of 59% workers is less than 5 years, 14.3% is in between 6 and 10 years and 26.7% is above 10 years. 22.93% workers have been residing at Hazaribagh for less than 5 years, 25.57% for more than 5 years whereas 51.50% workers have been residing for less than 5 years at Hemayetpur. Majority (78.20%) of the tannery workers smoke and all of them are male whereas in the previous study of Robiul et al. (2017) shows that 54% male tannery workers smoke [25]. There is no written agreement of tannery workers related to job. The tannery owners can terminate them whenever they want.

Table 3.2: Prevalence and patterns of health problems of the tannery workers

Ailment of the tannery workers	Number of respondents (N=266)	Percentage (%)	Average sufferings from disease
Sufferings of tannery workers due to particular disease			
Asthma	238	89.5	11.0(30.7)
Skin problem	238	89.5	11.0(30.7)
Gastrointestinal problem	174	65.4	35.0(47.7)
Chronic headache	177	66.5	33.0(47.3)
Ophthalmological diseases	167	62.8	37.0(48.4)
Frequent fever	114	42.9	57.0(49.6)
Jaundice	191	71.8	28.0(45.1)
Nail rotten problem	201	75.6	24.0(43.1)

Hearing problem	148	55.6	44.0(49.8)
Cardiovascular problem (hypertension/stroke/heart disease)	149	56.0	44.0(49.8)
Trauma/Injury	165	62.0	38.0(48.6)
Pain in joints	132	49.6	50.0(50.1)

Table 3.2 shows that asthma (89.5%), skin disease (89.5%), gastrointestinal problem (65.4%), chronic headache (66.5%), ophthalmological diseases (62.8%), frequent fever (42.9%), jaundice (71.8%), nail rotten problem (75.6%), hearing problem (55.6%), cardiovascular disease (56%), trauma/injury (62%) and pain in joints (49.6%), are the common health problems of tannery workers.

Table 3.3: Status of training, knowledge about chemicals and use of personal protective equipment among the tannery workers

Variables	No. of respondents (N=266)	Percentage (%)
Training status before working with tannery chemicals and machines		
With training	0	0
Without training	266	100.0
Having knowledge about the harmful chemicals		
Yes	60	22.56
No	206	77.44
Status of using Personal Protective Equipment (PPE)		
Yes	71	26.7
No	195	73.3
Personal protective equipment supplied by the tannery owners		
Yes	120	45.11
No	146	54.88

Having training on emergency exit and fire extinguisher		
Yes	7	2.6
No	259	97.4

Table 3.3 shows that 100% tannery workers enter into work without having training about tannery chemicals and machinery and 22.56% of the respondents know that chemicals have harmful effect on health. Only 26.7% workers use PPE and most of them (73.3%) do not use PPE. Though 45.11% tannery workers receive personal protective equipment from the tanneries, they do not use them due to lack of awareness. Only 2.6% respondents have training on emergency exit and fire extinguisher but most of them (97.4%) don't have.

Table 3.4: Environmental context of the workplace in Tannery

Environmental condition in the tannery	No. of respondents (N=266)	Percentage (%)
Ventilation		
Well ventilated	96	36.09
Poor ventilated	170	63.91
Lighting		
Sufficient Lighting	32	12.03
Insufficient Lighting	234	87.97
Temperature		
Cozy Temperature	10	3.76
Uncomfortable Temperature	256	96.24
Chemical fume		
No fume	12	4.51
With fume	254	95.49
Noise (mainly machinery)		
Free from noise	0	0
Noisy	266	100
Smell		
Normal	0	0
Bad smell	266	100

Table 3.4 shows that majority of tannery workers are exposed to adverse environmental conditions (e.g. poor ventilation, poor lighting, high temperature, high noise, bad smell etc.) which put them at health risk.

Lighting system is not good enough in the ground floor of majority of the tannery. Moreover, in almost all tanneries, ground floor remains wet because wet processing of leather is done in ground floor. On the ground floor, there are no other doors except main gate. Many of the tanneries don't have fire extinguishers. Many of the tanneries have the provision of filtered water as safe drinking water, but majority of workers don't take that water due to unconsciousness about their health.

Table 3.5: Health seeking behavior of the tannery workers

Treatment status	Number of respondents (N=266)	Percentage (%)
Receive medical treatment	150	56.4
Do not receive treatment	116	43.6
Availability of healthcare facility of the tannery		
Yes	0	00
No	266	100
Treatment supplement to the sick workers by the management		
Yes	26	9.8
No	240	90.2

Table 3.5 represents that among 266 workers of 20 different tanneries, only 150 workers (56.4%) receive medical treatment. The result also shows that there is no health care facility of the tannery. Very few sick workers (9.8%) get treatment supplement by the management of the tanneries; although they frequently fall ill due to hazardous working conditions.

Table 3.6: Association of health problems of the tannery workers with different risk factors (Cross table)

Risk Factors		Health problem		P- value
		(n)	(%)	
Age (Years)	<18	17	89.47	0.18
	18-30	106	87.60	
	31-40	87	94.56	
	>40	28	82.35	

Sex	Male	192	92.3	0.004
	Female	46	79.3	
Education	No education	70	93.3	0.55
	Primary incomplete	63	88.73	
	Primary complete	69	89.61	
	Secondary incomplete	35	83.33	
Daily working hours	8-9	9	90.0	0.95
	10-12	229	89.45	
Job Duration (Year)	<5	136	86.62	0.12
	5-10	37	97.36	
	>10	65	91.54	
PPE status use of the workers	Yes	70	98.5	0.003
	No	168	86.15	
Residence	Hazaribagh	114	88.37	0.69
	Hemayetpur	124	90.51	
Smoking Status	Yes	189	79.41	0.16
	No	49	84.48	

Table 3.6 demonstrates the association of health problems with different risk factors of tannery workers. It reveals that 94.56% workers (p value 0.18) are in between 31 and 40 years. It also shows that males are more susceptible to health problem (p value 0.004) which is statistically highly significant. Among 266, 93.3% tannery workers who do not have any academic education are susceptible to diseases (p value 0.55). There is insignificant association between job duration and health problems (p value 0.12). The result reveals that there is significant association between disease and use status of personal protective equipment (PPE) (p value 0.003). No significant association is recorded between disease and residence and same for the disease and smoking status.

Table 3.7: Health risk assessments of tannery workers (Binary logistic regression)

Factors		Health problem		OR	90% CI	P- value
		(n)	(%)			
Age	<18	17	89.47	1.83	(1.07-3.1)	0.064
	18-30	106	87.60			

	31-40	87	94.56			
	>40	28	82.35			
Sex	Male	192	92.3	1.42	(1.8-9.5)	0.004
	Female	46	79.3			
Education	No education	70	93.3	1.32	(0.8-1.9)	0.24
	Primary incomplete	63	88.73			
	Primary complete	69	89.61			
	Secondary incomplete	35	83.33			
Daily working hours	8-9	9	90.0	0.20	(0.02-1.5)	0.196
	10-12	229	89.45			
Job Duration (Year)	0-5	136	86.62	0.35	(0.2-0.6)	0.002
	6-10	37	97.36			
	11-40	65	91.54			
PPE use status of the workers	Yes	70	98.5	0.12	(0.23-0.53)	0.002
	No	168	86.15			
Residence	Hazaribagh	114	88.37	0.31	(0.13-0.74)	0.028
	Hemayetpur	124	90.51			
Smoking Status	Yes	189	79.41	2.82	(0.28-0.81)	0.45
	No	49	84.48			

Table 3.7 demonstrates that child labour engaged in tanneries whose age are less than 18 years, are of 1.83 time higher chance to suffer from disease (CI: 1.07-3.1, p value 0.064). Male respondents are of 1.42 time higher chance to suffer from diseases (CI: 1.8-9.5, p value 0.004). The result also shows that workers who don't use PPE are more susceptible to health problems (CI: 0.23-0.53, p value 0.002). Residence also plays a significant association for health problems. Tannery workers residing at Hemayetpur are more likely to be affected by diseases (CI: 0.13-0.74, p value 0.028). Smokers are of 2.82 times higher chance to suffer from diseases (CI: 0.28-0.81, p value 0.45).

Safe workplace is the basic rights of the workers. Safe work environment ensures safety and health for everyone at workplace preventing hazards and risks. The workplace environment encompasses cleanliness, temperature, ventilation, lighting, working space, dust and fume, pure drinking water, gender segregated toilets, washroom, restroom, canteen, ergonomics, health services and medical care etc.

The followings are the overview of the study area and respondents through Personal Observation, Key Informant Interviews and Focus Group Discussion.

1. Lack of cleanliness and good working conditions

It has been noticed that the working environment is not satisfactory in all the tannery factories. There are bad smells in all the factory area. Lighting and ventilation systems are also not adequate in many of the tanneries. Intensive sounds of rotating drums are observed in the area of wet processing of hides and skins.



Floor is flooded with waste liquer due to poor

Severely dirty back side of machine

Workers working without PPE

drainage system

Fig. 2.2: Glimpses of tanneries, 2019

2. Exposure to hazardous chemicals

Workers in many tanneries become ill due to get injured by dreadful workplace accidents and exposure to hazardous chemicals [26]. Workers face adverse effects of tannery as being workers of the tannery and being inhabitants directly they face due to surrounding environmental problem.

3. Exposure to hazardous machine

Limb damages occur among tannery workers caused by accidents using dangerous tannery machinery and absence of health safety practices with appropriate safety guards in sensitive machinery [27]. The reason behind this is - most of the machine do not have guards and sensors to protect from accident. The workers don't have training and knowledge about operational safety of machine. To avoid accidents, machines which are moving and in motion should be securely fenced, and screw, belt, or key or any revolving shaft, spindle of any machine driven by power should be covered as well.

Fig. 2.3: Glimpses of tannery workers, 2019

4. Lack of education and Knowledge

All of the respondents know that chemicals have harmful effects on health. But they don't know which chemical has how much potential to cause harm. Lack of knowledge poses the workers to health hazard.

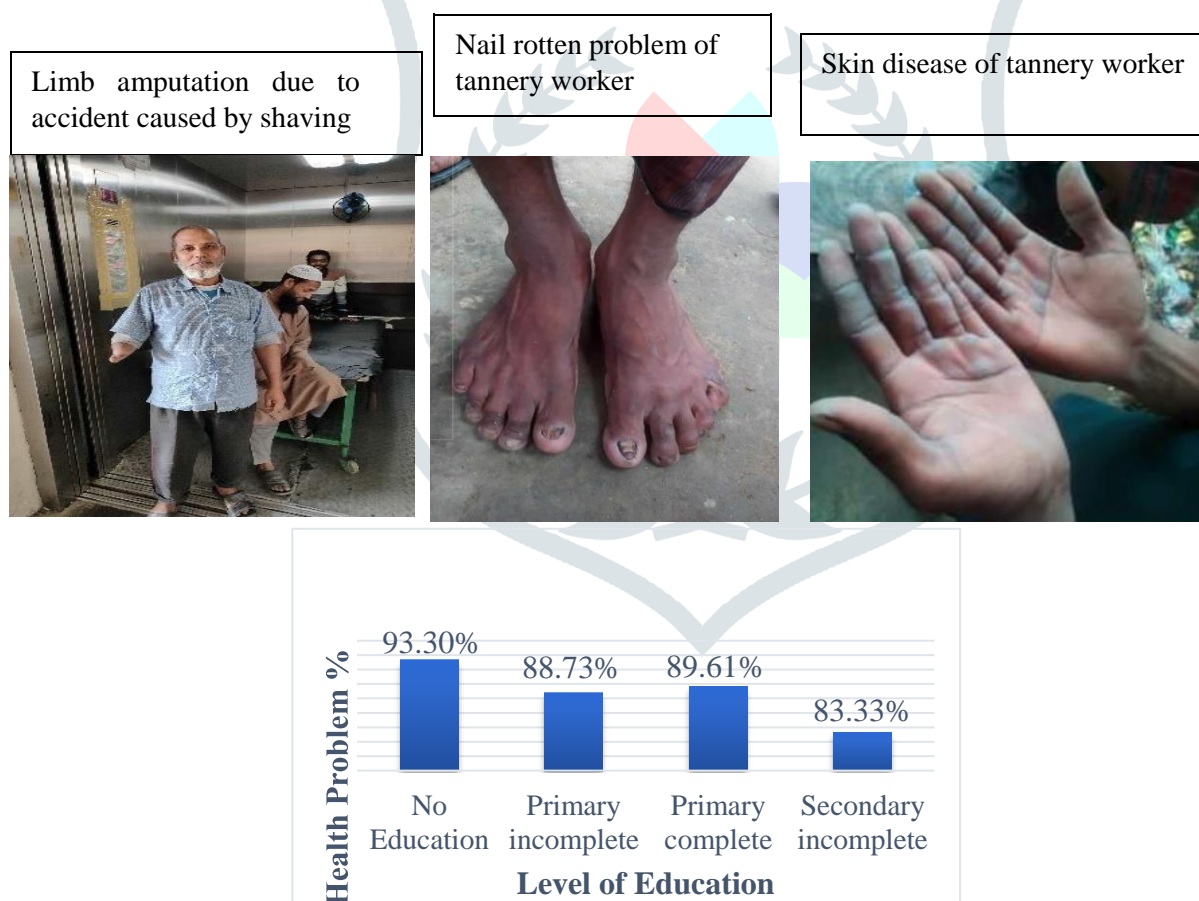


Fig 2.4: Association of education and Percentage of health problems

5. Lack of awareness due to having no training

Face-to-face interview, KII and FGDs show that 100% tannery workers enter into work without having training about tannery chemicals and machinery. Even they work with acids as with water. Training for the awareness

of workers about the adverse effects of occupational accidents and diseases will lead to the increasing enforcement of preventive measures to combat health risks.

6. Lack of supply of correct PPE

The quality of PPE that are supplied to the workers by only few industries is very poor and also very uncomfortable to them due to incorrect size; so they are very reluctant to use them. Many workers work without personal protective equipment in almost all tanneries; consequently major/minor accidents are being occurred on a regular basis. Tannery owners should provide training, guidelines on safety PPE to the workers and ensure their use on the workplace.

7. Lack of housing facilities

Except Apex tannery no other tanneries have housing facilities. There is no school in the tannery area for the workers' offspring. As a result, many workers reside at Hazaribagh, the previous home of tannery and they have to bear additional transport fare as they commute to workplaces from the capital. These costs could be avoided if they had accommodation facilities near the estate.

8. Lack of transportation facilities

There are no transportation facilities provided by the tannery owners. As many of the tannery workers (48.5%) reside at Hazaribagh, they have to go to tannery with their own cost of transport arrangement. A big amount of their wage is spent for transport cost.

9. Inadequate supply of food

Inadequate supply of pure food at low cost in nearby areas is a big challenge for the workers.

There is no canteen in the tannery estate which is also the violation of Bangladesh's law.

10. Low wage payment

Many of the temporary workers are paid only TK 3000-4000 monthly; though as per the provision of labour law minimum wage was hiked at TK 8000 per month in December, 2018. Averagely the workers make around TK 8000-10000 per month. They said that they had to struggle to cope with the price hike of essential commodities with their low income.

11. Excessive Working hours and job duration

In many tanneries workers are forced to work more than 12 hours which is the violation of Bangladesh's law. Both from personal interview and FGDs show that there is an association between health problem and excessive daily working hours and job duration of respondents.

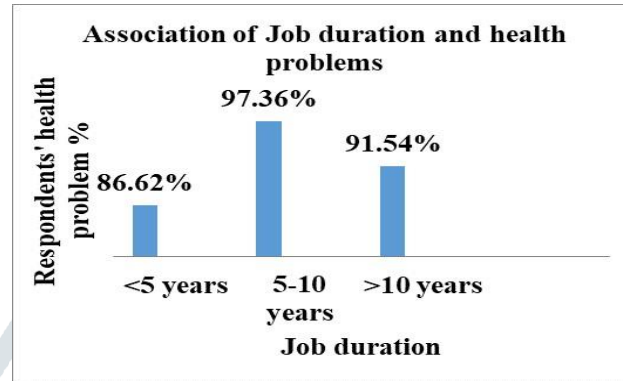


Fig. 2.5: Association of job duration and respondents' health problems

12. Discrimination between male and female workers

Female workers are being deprived from maternity leave in many tanneries which is against the Bangladesh' labour law. In many cases female workers are given low wages compared to male for the same work.

13. Child labour

There are child labours (7.1%) in many tanneries which is against the Bangladesh' labour law. These tender-aged workers frequently fall ill.

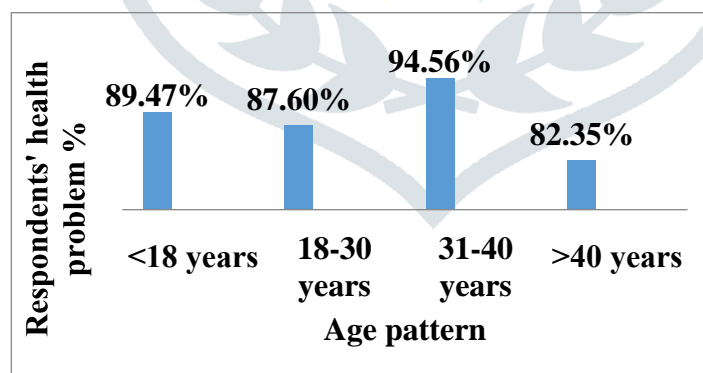


Fig. 2.6: Association of age pattern and diseases

14. Lack of Medical Facilities and Experts

At tannery estate, there is no medical center or hospital or any ambulance to carry patients to hospitals in times of emergencies; full-fledged medical hospitals are located more than 10 kilometers away. Most of the workers of the FGDs have complained of illnesses such as asthma, skin diseases, respiratory problems, nail rotten problem, jaundice, headache, ophthalmological diseases, injury, cardiovascular problem,

pain in joints and frequent fever caused by the extreme tannery pollution of air, water, and soil. Workers should be given incentives as they do the most risky job in tannery as because of unsafe working conditions.

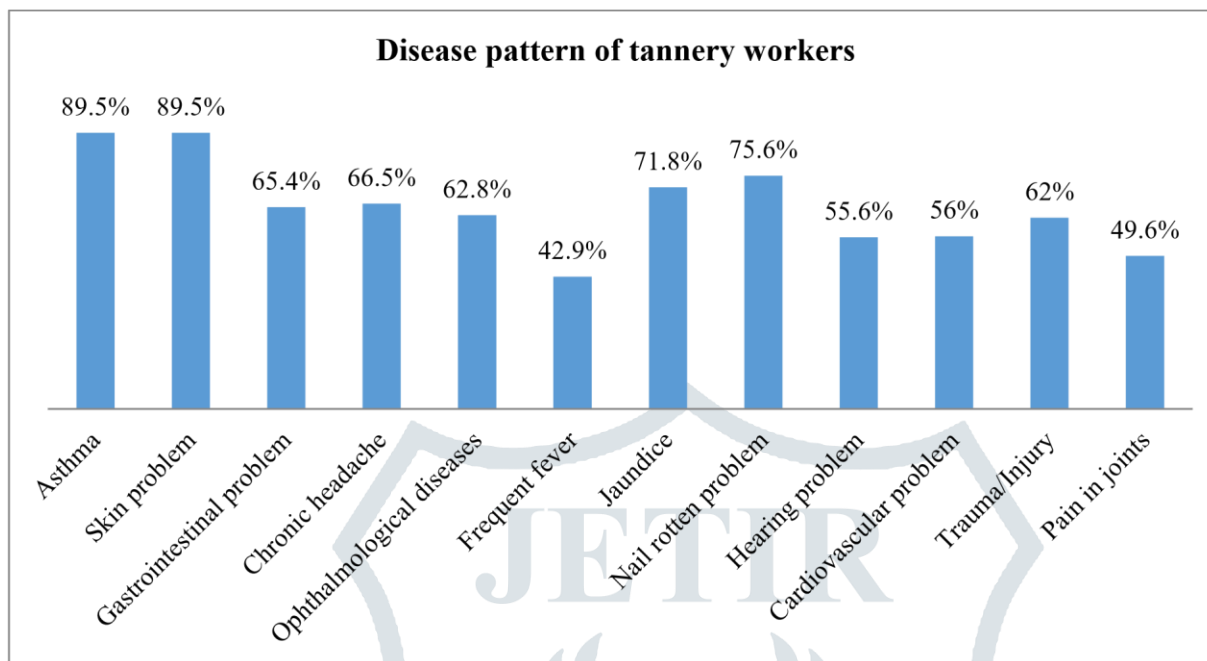


Fig 2.7: Disease pattern of tannery workers

15. Not having written agreement relating to job

The tanneries do not maintain any written agreement for the recruitment of workers. The workers always remain in fear that their job can be terminated at any time. Even sometimes they are sacked without showing any reason.

16. Lack of training on emergency exit and safety measures

Only 2.6% respondents have training on emergency exit and fire extinguisher. If any emergency situation occurs, there may be a casualty as majority of the workers don't have training on these.

17. Lack of enforcement of laws

Though tannery industry in Bangladesh is a promising sector with huge growth prospect, unfortunately, this sector is not well promoted and managed. This study states that tanneries in Bangladesh violate labor rights, and breaks health and safety rules. According to Bangladesh's Labour Act (2006), factories need to be cleaned and well-ventilated for dust and fume free work place. Bangladesh's Labour Act (2006) also dictates that factory should have the facility for adequate lighting, safe drinking water, and separate toilets for both male and female, precaution for possible accidents to make safe workplace for workers. However, it is not well practiced in tanneries. Illness among the factory workers and neighborhood residents of tannery is very serious issue, but there is no monitoring and action taken by law enforcements in Bangladesh [28].

IV. Conclusion

Worldwide leather is used as luxury items and the workers are the key to success of leather industries, but neither the owners nor the government of Bangladesh pay heed to the health of workers. This study infers that health issues along with safety practices in leather industries at Savar, Dhaka is not in conformity compared to the standard safety and health practices. Most of the workers have no knowledge about adverse effects of chemicals, machine risks, first aid, emergency exit, environmental pollution, etc. As a result they suffer from various health problems. There has never been any cost benefit analysis regarding health issue. It can be predicted that the amount of revenue that is brought for the country is very tiny compared to the health cost and environmental loss. Use of PPE, safe chemical handling, safe machine installation and maintenance not cost the production loss. Concurrently, it increases the product value for the market subsequently. So, as well as the construction of CETP, Bangladesh government should closely monitor and regulate the tanneries and rigorously enforce the country's labour and environmental laws to ensure the leather industries green growth and sustainability.

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