

Occupational Safety and Health (OSH) Risks for the Female Workers Engaged in the Shrimp Processing Industry in Bangladesh

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Abstract

Occupational Safety and Health (OSH) risks are emergent issues for the female work force in the Bangladesh shrimp processing industry. The Bangladesh Government, along with the United Nations Industrial Development Organization (UNIDO), the International Labour Organization (ILO) and the local shrimp factory owners, has taken the OSH issues seriously across the shrimp processing sector following several accidents that occurred in the Bangladesh garments industry. That shrimps are processed on ground floors of two-storied building, has made shrimp processing less risky with respect to fire and building safety. But working in cold and moist conditions for long periods, without adequate personal protection equipment (PPE) can cause health problems for workers. Respiratory problems and musculoskeletal pains are the common health issues perceived to be prevalent in shrimp processing workers.

Other OSH risks include faults in electric lines and connections to run processing machines, high sound volumes in the work environment, vibration around machine rooms, and prolonged work hours without ear plugs that can cause impaired hearing. Compressor machines and ammonia gas cylinders carry high risks of explosions and leakage of toxic gas, which can cause breathing ailments or can kill in severe cases. Recent investigations of OSH in shrimp processing revealed that female workers suffered more than their male counterparts from several illnesses and occupational diseases. They were also victims of wage disparity and were deprived of admissible leave and privileges. Since the majority of the shrimp processing workers are female, these OSH risks require additional scrutiny. The present paper investigated and presents findings of a study conducted to assess OSH status of shrimp processing workers in Bangladesh.

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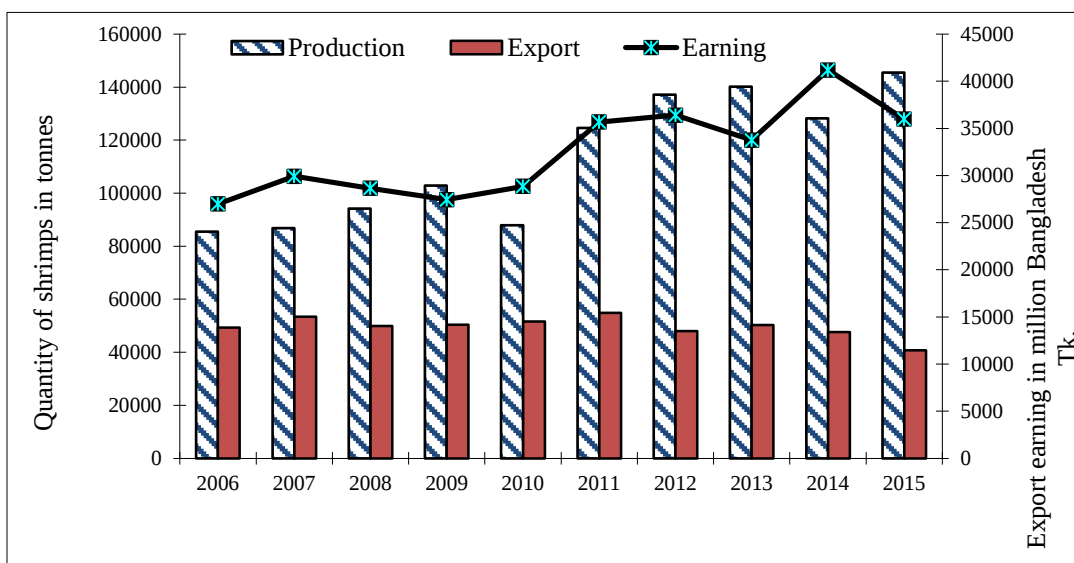
Introduction

For many years, Bangladesh has achieved and maintained significant economic growth and is expected to achieve even higher economic growth in the years to come. A very high export growth is believed to be one of the main contributing factors to this relatively strong growth of the Bangladesh economy in the 1990s (Mahmud 2008). Sustained export growth is reflected in the export earnings to GDP ratio that has quadrupled from 7 % in year 1995 to nearly 28 % in 2012, with the country's total exports bringing in USD 31.2 billion in fiscal year (FY) 2014-15 (MOF 2016). The shrimp industry is currently the fifth largest export earner, with frozen foods earning USD 638.19 million dollars, of which shrimp and prawn exports contributed about 80 % in FY 2013-14 (Export Promotion Bureau 2015). Bangladesh accounts for 2.5 % of the global shrimp trade (FAO 2016).

The shrimp farming industry in Bangladesh is conducted in a manner that is far from the modern aquaculture practiced in other contemporary shrimp producing countries. The majority of the farming areas are under natural irrigation systems that receive tidal brackish water seasonally and which farm rice and shrimp alternately.

The production regime is around 300 kg to 400 kg. ha⁻¹. yr⁻¹ on average. This is low production per unit of land compared to that in other neighbouring countries. Shrimp are farmed on approximately 275,500 ha of land and the average shrimp-rice farm size is 1.4 ha. About 145,500 tonnes of shrimp were produced in 2015 (DoF, 2016).

The difference between total shrimp production and export has expanded gradually over the last 10 years as more shrimp are consumed locally today compared to that being exported. In 2015, Bangladesh exported 40,726 tonnes of shrimp, which is about 28 % of total raw shrimp production. The country's shrimp export has declined gradually since 2011, and has fallen from the second top to fifth position in the national export earnings. The current shrimp export volume is about 18 % less than that of the 10 year average, while the farmed shrimp production has increased from 2011, albeit with a drop in 2014 (Fig. 1).



Source: DOF Bangladesh

Fig. 1: Trend of Bangladesh Shrimp production, export and earning, 2006 - 2015

90 shrimp processing factories operate across the coastal region of Bangladesh, engaging between 50,000 and 60,000 workers, of whom about 70 % are women. Most of the shrimp processing plants are under utilised relative to their installed processing capacity and the businessmen are apparently unhappy in terms of the future of their “unfertile investment.”

Workers' Occupational Safety and Health (OSH) issues in industries including the shrimp processing industry have been a grave concern. After several tragic incidents of the building collapses and fires that have killed and injured thousands of workers in the readymade garment (RMG) industry, international buyers and consumers are also looking carefully at OSH matters across the shrimp processing sector. In 2016, due to the lack of safety in workplaces, accidents and casualties caused the deaths of at least 1240 workers in several industries, including 89 female workers (OSHE 2016).

Most of the shrimp processing factories in Bangladesh are considered safer than factories in other industries, from the perspectives of fire and building safety (Nuruzzaman et al. 2014). Shrimp processing work is done in wet and chill conditions on ground floors of 2 storey buildings in which the office and administrative units are usually situated on the first floor. The Fisheries Department mandates the strict enforcement of food safety and HACCP

(Hazard Analysis and Critical Control Points) rules and needs to grant export certificates for each consignment of shrimp and seafood exported. This system has made the handling and processing of this valuable commodity safe from any health risk for its overseas consumers. But the safety and health of the workers behind the safe commodity is often neglected.

The issues of occupational safety, health risks, accidents in the workplace, and occupational diseases for the workers remain mostly undisclosed. In addition, health hazards related to work in cold, moist and slippery environments, especially on night shifts, have important implications for labor productivity. The issue of OSH for the shrimp processing workers has not been addressed until recently.

This paper investigates and explains the current state of OSH practices. The information was collected through a comprehensive action-oriented survey in the Bangladesh shrimp processing industry. The specific objectives are to give an overview of OSH status in relation to female workers across the shrimp processing industry; to give an account of OSH risk areas affecting female workers; and to recommend ways to improve the OSH situation across the shrimp processing sector in Bangladesh.

Methodology

The paper builds on the data set collected through a comprehensive survey conducted by the Economic Research Group and funded by the International Labour Organization (ILO) Shrimp Project in Bangladesh. As part of the study, 536 factory workers, 27 factory owners/general managers/managers (operation), 31 Labour compliance officers, and 35 Labor supervisors from 40 shrimp processing factories (30 from Khulna region and 10 from Chittagong region) were interviewed face-to-face using structured questionnaires. The interviews were carried out inside factory premises and also at the worker residences. Of the total 536 workers, 403 were drawn from Khulna and the remaining 133 from Chittagong (Table 1).

In addition to the interviews, Focus Group Discussions (FGDs) and Key Informant Interviews (KII) were conducted with staff of Fish Inspection and Quality Control (FIQC), Department of Fisheries (DoF), Department of

Inspection for Factories and Establishments (DIFE), Ministry of Labor and Employment (MoLE), Government of Bangladesh Joint Director of Labour in Chittagong and Khulna, the leaders of Bangladesh Frozen Food Exporter's Association (BFFEA), Khulna and Chittagong, 4 Labor Contractors, 3 Trade Union leaders, and several Participation Committee members from different processing factories.

Table 1. Shrimp processing workers interviewed for the OSH study undertaken from the processing factories across Khulna and Chittagong region, 2015

Interview location	Worker type	Khulna region	Chittagong region	Total
Inside Factory	Permanent to Factory	207	83	290
	Casual to Factory	2	0	2
	Contractor worker	6	0	6
	Sub-total	215	83	298
Outside Factory	Permanent to Factory	86	23	109
	Casual to Factory	22	4	26
	Contractor worker	80	23	103
	Sub-total	188	50	238
Total		403	133	536

Results and Discussion

Current state of OSH in the Bangladesh shrimp industry

Occupational safety and health issues are always a concern for workers engaged in industries in the poor and developing countries. The shrimp processing industry in Bangladesh is no exception to this. After the destructive incidences in the garment factories, the Bangladesh government, international buyers, and consumers have taken OSH issues in Bangladesh seriously. Even though no such destructive incidences have occurred in the shrimp processing industry thus far, renewed attention has been given to this sector.

Only a few papers have explored the OSH situation of the shrimp processing factories in Bangladesh, and even these do not give much detail and the studies were often only peripheral to other work. Common observations were that most of the workers have to work in low temperatures and work standing for long hours (Nuruzzaman et al. 2014; Islam 2008; Verite 2009; SAFE, 2012). Some mentioned inadequacies in terms of safety and health

protection. Further, workers, mostly females, often suffered from fungal infections, muscle and back pain, stomach related problems, cuts and so on. Factories rarely provided any compensation to injured workers, arbitrarily granting some meager lump sum payments. There had been many more studies looking into different aspects of the shrimp industry, including with a focus on the details of the shrimp supply chain (Tasnoova et al. 2010; Verite 2009; Nuruzzaman 2006; Hensler 2013; Islam 2008).

Some studies focused on the rights and benefits, working conditions and the nature of employment contracts in processing factories (Nuruzzaman et al. 2014; EJJ 2014; Verite 2009; SAFE 2012; Islam 2008). These have addressed the issues of working condition in the processing factories, all being critical of the treatment of the workers in those factories. Few of them looked into the issues of freedom of expression and the collective bargaining power of the labor force employed in this segment of the industry.

Working in cold and moist condition for longer period can cause problems for workers. Symptoms like colds, coughing, sneezing, running nose, asthma, and accumulation of water in the lungs are the common ailments perceived affecting processing workers. Working long hours while standing causes backache and repetitive work in certain postures may cause musculoskeletal disorders. Rules and directives in the labour laws are meant to ensure occupational safety and health for the workers and maintain a healthy workforce.

Our objective was to gather information on prevailing working conditions; understand the gendered distribution of labour during shrimp processing; determining issues on OSH and the status of workers training on safety health and use of personal protective equipment (PPE).

The study revealed that shrimp deheading, peeling, deveining, panning and packing were female dominated activities, whereas receiving, sorting, grading and weighing were done mainly by the male workers. Heavy duty activities such as lifting ice blocks storage and operating machines also were done mainly by the male workers (Table 2).

Table 2. Division of labor across the shrimp processing factories in Bangladesh, 2015

Task number	Types of work	% of Females (n=388)	% of Males (n=148)
1.	Receiving	0.3	12.2
2.	Sorting	0.8	18.6
3.	Grading	0.3	7.1
4.	Deheading	27.6	1.9
5.	Washing	1.5	1.3
6.	Peeling	3.9	1.3
7.	Deveining	3.9	0.0
8.	Weighing	4.1	7.1
9.	Panning	16.5	5.1
10.	Packing	17.3	6.4
11.	IQF	15.2	16.7
12.	Ice lifting	0.3	1.9
13.	Work in machine room	0.5	16.0
14.	Cleaner	2.1	1.9
15.	Others	5.9	2.6

Demographic and socio-economic conditions

The workers engaged in the shrimp processing industry were young; 72 % of female and 76 % of male workers were under 35 years old. More girls under 18 were found, compared to their male counterparts (Table 3). Unmarried women, along with separated, widowed and divorced women, made up about 37 % of the female workforce. They have been considered less powerful players in the labour market.

Table 3. Age, education and marital status of sample shrimp processing workers interviewed in 2015

	Age			Education			Marital status	
	% Female	% Male		% Female	% Male		% Female	% Male
18>	2.8	1.3	No schooling	36.4	9.6	Married	63.1	68.4
18 – 25	30.9	34.6	Up to 5 years	48.6	35.9	Unmarried	14.7	31.0
26 – 35	38.1	40.4	Up to Secondary School	14.0	47.4	Separated	9.8	0.6
36 – 45	22.7	17.3	Up to Higher Secondary School and above	1.0	7.1	Widow	9.5	0
46 and above	5.4	6.4				Divorced	2.8	0

Female workers' wages were 26 % less than those of male workers in Khulna region factories and 31.5 % less in Chittagong region factories (Table 4). The subordinated social position of girls and women with little or no schooling may have pushed them to the surplus labour market and to accept such wage disparities for their survival.

Table 4. Wage difference of sample shrimp processing workers interviewed in 2015

Region	BDT/month		Remarks
	Male	Female	
Khulna	5,826.00	4,299.00	26.2 % less than males
Chittagong	6,231.00	4,270.00	31.5 % less than males

Note: BDT = Bangladesh Taka

Health risks, illness and diseases

The respondents were asked if, during their work, they experienced extreme cold temperature, slippery floors, had to lift heavy objects, had to work near fast spinning machines with loud noise and vibrations, had to work standing for long hours, had to and inhale harmful ammonia gas, or faced other hazards. They were also asked whether they suffered from illnesses or diseases which they perceived were due to working in the shrimp factory.

Table 5. Occupational Safety and Health risks indicated by the shrimp processing workers in their workplaces, 2015

Response types (%)	Work in extreme cold		Work in slippery floor		Lift heavy object		Work in heavy noise		Work in vibration		Work standing long hour		Inhale NH ₃ gas	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Never	44.6	47.7	69.6	72.3	79.3	62.6	65.5	61.9	84.3	82.6	13.9	26.5	67.8	74.2
Always	27.6	25.8	3.9	5.2	5.2	14.2	13.1	16.1	2.8	5.2	72.2	47.7	0.5	0.6
Frequently	4.6	4.5	0.5	0.6	2.1	1.9	3.1	3.9	1.0	0.6	3.4	5.8	1.6	0.6
Sometimes	17.3	14.2	17.5	11.6	8.3	15.5	9.5	9.0	2.8	3.9	10.3	18.1	2.6	2.6
Rarely	5.9	7.7	8.5	10.3	5.2	5.8	8.8	9.0	9.0	7.7	0.3	1.9	27.5	21.9

Note: F – Female, M – Male

The majority (about 55 % of females and 52 % of males) of the workers had to work in extreme cold conditions (Table 5). About one third of the respondents reported working on slippery floors, with only small variations between males and females. Just less than 40 % of male workers performed their jobs amidst loud noise and lifted heavy objects, whereas 65 % of female workers never worked in noisy areas, and about 80 % of them did not lift heavy objects.

Working while standing for long hours was a common problem for both female and male workers as 84 % of females and 73 % of males mentioned the inconvenience of standing long hours and reported illnesses such as musculoskeletal pain, lower back pain, back pain and swelling of hand/feet swelling that were related to long standing work (Table 6).

Table 6. Workers response on their sufferings from different illness across shrimp processing factories in Bangladesh, 2015

Types of illness	% Females (n=388)	% Males (n=148)
Cold/cough	59.6	50.3
Nausea/Dizziness	7.5	3.9
Lower back pain/back pain	4.6	3.9
Musculoskeletal pain (Pain on leg/hand/waist)	4.4	1.9
Fungal infection	3.9	0.6
Hand/feet swelling	2.1	0.6
Stomach pain/vomit	1.0	1.3
Fever	1.0	2.6
Fainting	0.5	0.0
Poor appetite	0.3	0.0
Impaired hearing	0.3	0.0
No illness	14.1	35.5

The survey revealed that the shrimp processing workers were suffering from 11 different illness and 5 occupational diseases (Table 6 & 7). Among the illnesses that were related to the unpleasant working conditions colds, coughs, dizziness, musculoskeletal pain, of hand/feet swelling and fungal infections appeared the most common for the female workers. Prolonged illnesses associated with shrimp processing jobs may lead to a number of diseases reported by 32 % of the female respondents. Among those diseases, skin diseases, spinal cord and bone related pains and chronic coughs, asthma and pneumonia are notable. Some workers also reported bearing multiple diseases. Less than 5 % of the male respondents admitted the sufferings from occupational diseases in shrimp processing jobs, compared to 33 % of females who reported diseases.

Working with wet raw materials in chilly conditions made shrimp processing factories less risky than other factories in terms of fire safety. But workers health problems, illnesses and diseases cannot be neglected. The present study noted that small amounts of medicines were provided by the

factories and about 72 % of the respondents said that they received painkillers, antibacterial ointments, oral rehydration salts, bandages, band-aids and other medicine from first-aid boxes in cases of emergency.

Table 7. Workers response on their sufferings from different diseases across shrimp processing factories in Bangladesh, 2015

Types of diseases	% Female (n=388)	% Male (n=148)
No disease	67.6	95.4
Skin diseases	22.3	2.6
Spinal cord, nerve or bone related problems	5.2	1.3
Chronic cough	3.1	0.7
Asthma	1.0	0.0
Pneumonia	0.8	0

Vaccination and health checkups

The respondents were asked about any disease prevention steps taken by the factories to avoid health risks. About 53 % of the respondents said that the employer arranged their blood test for blood grouping, as an important requirement of labour laws required the display of group on each workers' ID card. Further 14 % of respondents said that they were vaccinated against important communicable diseases, especially tuberculosis, malaria and hepatitis. In addition, 13 % of respondents said that their factory helped them to undergo skin and venereal disease tests; 11 % said they had done pathological tests and only 4 % said they had to undergo a general health checkup arranged by the factory.

Structural weaknesses were found in the adequacy of human resources to maintain workplace safety and health. About three-fourths of the respondents reported no appointed medical officer, and 77 % reported no trained nurses had been appointed in their factories. The labour laws specify a full time medical officer equipped in performing surgery if required be appointed for factories having 300 or more workers; and a trained nurse with an almirah (cupboard) for necessary instruments along with first aid boxes and emergency medicine was required for factories having 150 workers or more (BLA 2006). More than 80 % of workers however, said that their workplaces had first aid boxes.

Fire, electrical, mechanical and chemical safety and risks

As shrimp processing involves handling wet raw materials in cold conditions, these activities generally are safe from fire risk, even though the general stores of packaging materials contain dry paper-board, polythene sheets, packets and other wrapping materials that are fully combustible. These areas and others in the factories have high fire risks, for example, from electrical short-circuits, fuel and lubricant stores, laundries and kitchens.

Electricity can ease production work but poor or unskilled use of electricity may be hazardous and risky. Faults occur in electric lines and connections in processing machinery. In 2015, accidents from electrical shocks were reported (Deputy Director, Fire Brigade & Civil Defense, Khulna, personal communication), possibly due to the use of poor quality cables, exposed surface lines and/or low quality electrical fittings.

The machines used in shrimp processing factories are important for continuous production, but if they are not operated with due care, workers may be endangered. Apart from shrimp processing equipment inside the processing buildings, vehicles, refrigerated vans, generators, boilers and other machines are found outdoors in the factories. The present study observed anomalies hampering mechanical safety including untrained operators on machines and machine-specific standard operating procedure (SOP) was ignored. Moreover, lack of machine-specific efficiency tests, lack of maintenance, negligence in using personal protection equipment (PPE), unprotected wheels and gears, and inadequate care during risky machine operations could have caused mechanical accidents.

Working in noisy engine rooms were harmful to the workers. Prolonged exposure to noise may impair hearing and gradually make workers deaf. In compressor rooms, ammonia cylinders can burst and kill workers; leaking ammonia gas, if inhaled, can also injure or kill workers. Freon, although a safe refrigerant gas, is still very limited in the shrimp processing industry in Bangladesh.

Chemical safety and health risks

In addition, faults in storage of fuels and lubricants may cause fire. Use of chemicals for laboratory tests like sulfuric acid and other chemicals may cause health hazards. Chlorinated water and detergents are used for cleaning of utensils and floors through pressure hosepipes inside processing factories and this may cause inhalation of aerosols and cause eye irritation if adequate protective measures are not taken.

Incidence of accidents in the workplace

Over the year prior to the survey, 15 % of female and 22 % of male workers reported experiencing accidents. Out of injured female workers, 30 (out of 57) had been absent from their work and, if the absence was for two weeks or more, they were permitted leave without pay. For the 14 female workers who had major injuries, the employers bore full treatment costs. The labour laws had provisions wherein the employer had to bear the full cost if an accident was not caused by worker negligence. In addition, the worker was eligible for full wages for first 2 months, two-thirds wage for the next two months and half wage for 8 months if the worker needed that period for treatment and recovery. For accidental death, the bereaved family would be awarded a one-time payment of BDT 100,000 and BDT 125,000 if a worker was reduced completely disabled by accident (BLA 2006).

Accident prevention and training on OSH

Personal Protective Equipment (PPE) or safety equipment was an important element of prevention and most of the respondents indicated this equipment was provided. Despite this, some reported that important PPE such as safety goggles for welding, gas masks in the compressor room, and ear plugs in the engine room had not been used regularly. PPE commonly supplied included aprons, gum boots, caps, and masks. Warm clothes were supplied in the majority of the factories (61 %), but 45 % of the female workers had no warm clothes. Gloves for shrimp peeling had not been used by many female workers because they could not peel shrimp quickly when wearing them and this reduced their earnings as most of the peeling workers were paid piece rates.

The survey revealed that only 3 % of workers received training on machine operations by the employer; and 33 % received training on fire safety provided jointly by the Fire Brigade and Civil Defense, Ministry of Labour and Employment and non-government organisations (NGOs). None, however, received training on occupational safety and health despite the imperative to do this.

Rules and directives provide the legal basis to ensure occupational safety and health for the workers. The responsibility for maintaining safe and healthy workplaces lie with the employers, who are expected to arrange regular training and awareness programs on OSH to build a healthy and productive workforce.

Recent progresses

Overall, OHS related issues are still concerns for the shrimp processing industry, even if they are less severe compared to other export-oriented industries such as RMG. To improve the OSH situation and minimise the sorts of risks outlined above, both the industry and concerned government departments have been keen to take some positive steps. Considerable early stage progress has been made.

Apart from the present fact finding assessment carried out by the Economic Research Group, the industry has been striving to overcome some of the shortcomings through the United Nations Industrial Development Organization (UNIDO) and ILO shrimp projects to explore the way out of fixing the OSH problems. Under the financial support from the Better Works and Standard Project – Better Fisheries Quality (BEST-BFQ), UNIDO, the Bangladesh Frozen Foods Exporters Association (BFFEA) hosted a series of OSH workshops, the first time of their kind, in April 2014 in Khulna and Chittagong at the BFFEA Conference Halls. Technical officials from the processing industries, officials from the Department of Inspection, Medical Officers from the MOL&E, experts from Fire Brigade and Civil Defence (Table 8) were invited. The workshops aimed at exploring the concept of occupational safety and the occurrence of health problems at the different stages of shrimp and seafood processing. Ground level technical officials who attended the OSH needs assessment workshop included plant engineers, factory managers,

overseers, electricians, shift-in-charge staff, boiler operators and machine room operators. The needs assessment identified a number of problems (Table 9).

Table 8. OSH initiatives undertaken by the shrimp processing industry, 2014-2015

Project	Activities	Participants	Location	# Events	# Participants
BEST-BFQ, UNIDO	OSH Workshop	Factory Managers, Over sheers, Plant Engineers, Electricians Shift-in-Charge Boiler operators	Khulna & Chittagong	4	120
ILO Shrimp Project	Occupational Safety & Health Risk Assessment	General Manager, Compliance Officer, HR Manager	Khulna & Chittagong	3	85

Table 9. OSH problems identified.

1. Unqualified or underqualified staff can hold technical positions and operate machines, plant and equipment
2. Standard operating procedures (SOP) for important machines not available; when available, may not be in local language
3. Machines are not under regular maintenance/overhauling
4. Workers in machine rooms work with loud sounds and strong vibrations
5. Electrical fittings, cables and joints are often faulty
6. Ammonia is used as refrigerating gas; danger of toxic gas leakage
7. Regular fire drills not practiced in most of the factories
8. Doctors and nurses are not available as per requirement of the laws
9. First aid supports and emergency medicines are often inadequate
10. Insufficient supply of PPE and lack of awareness of use of PPE
11. No training on OSH
12. Absence of factory safety committees or safety officers
13. Lack of factory inspection for OSH from the government departments

During the ILO shrimp project, 2014-2015, the expertise of an international Industrial Health Risk Assessment expert from ILO Head Quarters was available during visits to shrimp processing factories, shrimp landing centers and shrimp farms across Khulna region. Along with local OSH experts, the ILO project developed an OSH training manual based on factory based Health Risk Assessments and, in June 2015, held several training workshops in the Khulna region. From both the projects, the training resources were gathered and translated into an OSH Training manual in Bangla and published by the

BFFEA. The OSH training manual has been used for factory based workers' training across all functioning shrimp processing factories in Bangladesh.

Tangible outcomes from both the UNIDO and ILO shrimp projects included providing labour laws training for about 7,500 workers and staff from the industry; preparation and printing of Guidelines on Labour Laws Implementation by the UNIDO shrimp project; Labour Laws and OSH Training Manuals, Employers Handbook; and OSH Training Manual from the ILO shrimp project.

The Bangladesh Government has amended the Labour Laws 2006, published Labour Rules 2015 and reorganized and upgraded the Department of Factories and Inspection and recruited about 200 factory inspectors to streamline factory inspections.

Despite the progress, however, challenges remain. Recently, many workers and staff have been trained in the Labour Laws, factory rules and in industrial relations across the shrimp industry. Despite this training, and training for trade union leaders, participation committee members and safety committee members, the majority of the industry owners apparently lack interest in better labour compliance. Additional situation analyses may be needed to better understand this situation.

Severe lack of raw shrimp supply in the local market drove most of the processing companies into unhealthy competition with each other. Brokers and middlemen bid higher prices to attract more shrimp from the auction markets and landing centres for influential companies. Such competitive pricing through open auction should be good for the shrimp farmers, but it caused small processing companies to purchase less and under-utilise their processing capacities. Processing workers were in less demand and the Fish Inspection and Quality Control, Department of Fisheries, reported that export performance has been skewed with only 15 to 20 good processing factories out of 90 factories running shrimp processing business.

Recent price fluctuation and low demand for black tiger shrimp (*Penaeus monodon* (Fabricius 1798)), plus dumping of white shrimp (*Penaeus vannamei* (Boone 1931)), by the international market made the business situation further uncomfortable for Bangladeshi exporters. Bangladesh produces

black tiger shrimp which constitutes about three-fourth of its export, and this trade becomes vulnerable when price and demand for black tiger goes down. Poor export performances jeopardise the chances of more attention to worker OSH.

Conclusions

The OSH issues discussed so far are not exhaustive and need to be explored further with continuous in-depth observations. Working in cold and moist condition for extended periods without proper warm clothes can cause problems for the workers. Various respiratory diseases and ailments may reduce workers' productivity as well as cause workers to dislike the industry. Proper gloves should be supplied and their use ensured so that workers can avoid suffering from hand infections. Work while standing for long periods has already been changed in other countries by using adjustable and comfortable chairs. Peeling and deveining of shrimp can be done wearing special plastic nails which has already been used in Thailand and other counties. Backache and musculoskeletal pains for repetitive work in certain postures can be reduced by shifting duties and arranging physiotherapy for the affected workers.

The shrimp industry plays an important role in terms of employment creation, rural development and foreign exchange earnings for Bangladesh. The sector employs a large number of workers across the value chain along with the potential to employ many more in future with an even greater contribution to economic growth and development. Since women are employed here in increasing number, the performance of the industry also plays an important role in empowering women in Bangladesh.

To reap the potential benefits from this industry we need to address OSH issues with outmost care and sincerity. Sustainable development of a sector or industry always requires a congenial working atmosphere for the workers and a better understanding among the stakeholders across the value chain. Most of the issues raised in the present study may not be fully understood and cannot be solved overnight, but they require further investigations, moving forward with solutions, and reporting on progress made.

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