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"An Assessment Of The Health Status of Ship Recycling Workers (SRW's) in Sitakundo &Vatiary , Chittagong, Bangladesh"

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Abstract: *The ship breaking and recycling industry (SBRI) converts end-of-life ships into steel and other recyclable items. Ship recycling offers the most environmentally sustainable way of disposing of old vessels, with virtually every part of the hull and machine complex being reused or recycled as scrap metal.. Most workers in the ship breaking yards are migrant workers from poorer regions of each country. The percentage of such migrant labor is higher in Bangladesh compared to Pakistan. A major reason for employment of migrant labor is the hazardous nature of the job as well as variations in employment levels depending on the extent of ship breaking work being done. Working conditions have historically been poor for the majority of these workers, with limited use of personal protective equipment, frequent exposure to hazardous materials, and unsafe conditions. Accidents causing fatalities and injuries are frequently reported in the local media. The lower health and safety regulations in Bangladesh makes it an ideal place to host a huge, but immensely hazardous ship-breaking industry in its second capital, Chittagong. Previous literature dictates that the health hazards faced by the thousands of low-wage, unskilled/semi-skilled workers in this industry are indescribable. To identify these occupational risks and hazards, we conducted this study by concerning civil surgeon office during the period from July 2017 to December 2017. The aim of our study was to assess the health status of Ship Recycling Workers (SRW's) in these industries. We have conducted 3 FGD with ship breaking workers and 8 Key informants' interview with different stakeholders in sitakund and vatiary. In-depth interviews and focus group discussion were used to collect necessary data/information from workers and others stakeholders. The study areas were a few ship-breaking yards in Sitakunda, Chittagong and data collection was done from July 2017 to December 2017. Along with this data, we have collected data from the secondary data sources and also reviewed different literature. The health hazards faced by the workers were divided into five categories, namely, Serious Accidents, Physical, Biological, Mechanical and Ergonomic and Psychological. From the primary analysis done .It was also found that due to the larger profits generated from not addressing these issues, lack of work-rights awareness among workers and absence of government intervention to protect the workers, the scenario was not likely to change Recommendations include immediate attention of the labor authorities towards these economically important industry workers' occupational health and safety standards, regular health and hazards inspection of the sites to establish sustainability of the regulations and training and awareness programs for the workers to help them raise their voices against being exploited.*

Keywords: *Ship breaking industries, Health Status, Safety of workers, Environmental hazards, Child labor.*

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I. Introduction

Ship demolition or ship dismantling is an important component of ship disposal of old, unused and expired ships. The process is also called ship recycling. Modern ships after 25 to 30 years of service are sent to the ship breaking yards because of corrosion, metal fatigue and old fashioned. Ship-breaking allows the materials from the ship, especially steel, to be recycled and made into new products. Ship-breaking is a challenging process, due to the structural complexity of the ships and the environmental, safety and health issues involved. Due to cheaper labour costs and fewer health and safety regulations that have to be followed, the developing world hosts the vast majority of ship breaking efforts. It is also considered one of the world's most dangerous industries and is very labor-intensive. From early 1980's global ship industry relies upon the developing world to dispose of deep sea vessels3. The purpose was to avoid the burdens of complying with developed world standards for the safety and management of hazardous waste. Ship recycling industry developed rapidly and successfully in Bangladesh since 1960. In 1983, there were 32 companies involved in the scrapping industry and the number has grown to about 50 in recent years7. Now Bangladesh has become one of

the largest ship breaking and recycling industries in the world. But at the same time Bangladesh is facing occupational and environmental health risks associated with dismantling of old ships. For a developing country with relatively little industrial capacity such as Bangladesh to meet the domestic demand for industrial products, deep sea vessels are entirely salvaged for materials like steel, chemicals, oil, woods, engine, furniture, utensils and even toilets . Commission mentioned that a worker on demolition site in Bangladesh and India earns just one to two dollars per day, and expenses for safety and health are negligible; while the cost in Netherlands can be estimated at around $250 per day for a worker and $13 in Bulgeria Bangladesh is dependent on ship scrapping for fulfilling its domestic demands for steel and iron. Although the steel is recycled, the toxic substances such as polychlorinated biphenyles (PCB), metals, asbestos, lead, waste oil, tributyltin (TBT) etc are exposed to environment and to these poor uneducated ship recycling workers. Ship scrapping is not regulated by environmental law, nor is there care for the health and safety of the workers. Workers who are working in these vessels have no protection from explosions, asbestos or a cocktail of toxic chemicals contained in the ship. Over the last 20 years more than 400 workers have been killed and about 6000 were seriously injured that indicates the highest accidents and casualties at the yards in the region.

In many ship breaking yards in Bangladesh, ship recycling workers (SRW's) are not using Personal Protective Equipment (PPE), for skin, eye or lung protection. Necessary PPE for working in specialized areas, such as respiratory protective equipment for working in oxygen deficient areas are not used. There is usually no equipment for machine safety, fire safety, chemical safety and water safety, and when such equipment exists, these are poorly maintained. With a few exceptions, the vast majority of workers do not receive any information on the hazards or risks to health and safety, nor do they receive any training on how to minimize risks to health and ensure safety at work. Improper storage and disposal of scrap metal and waste contaminate the soil and groundwater resources, causing acute and long-term environmental pollution. Most of the ship breaking yards have neither any containment to prevent pollution of soil, air, marine and freshwater resources, nor the technology needed to ensure the environmentally safe management and disposal of hazardous wastes and materials. Poor safety systems, use of old methods in cutting giant ships, and lack of precautionary measures causes occupational diseases and health hazards of the ship recycling workers at Sitakundo and Vatiary upazilla in Chittagong division.

a) Background history of the industry

The ship-breaking industry started its operations in the 1960s when a Greek ship 'MD Alpine' was stranded on the shores of Sitakund, Chittagong after a severe cyclone. The ship remained there for a long time before the Chittagong Steel House brought the vessel and scrapped it. During the Liberation War in 1971, a Pakistani ship 'Al Abbas' was damaged by bombing. It was later salvaged and brought to the Fauzdarhat seashore. In 1974, Karnafully Metal Works Ltd bought it as scrap, introducing commercial ship-breaking in Bangladesh. The industry flourished during the 1980s. Today it has become large and profitable industry for Bangladesh. Ship breaking was strongly considered as a merchandised operation until 1990. On that time it was concentrated for those who were industrialized countries like United Kingdom, Germany, Italy and United States of America. From early 1980s, profitable ship owner used to send their vessels for profit maximization to India, Pakistan, Bangladesh and Vietnams because scraping cost are minimum in these countries. Currently, the global center of the ship breaking and recycling industry is located in South Asia, specifically Bangladesh, India, and Pakistan. These three countries account for 70–80 percent of the international market for ship breaking of ocean-going vessels, with China and Turkey accounting for most of the rest. Only about 5 percent of the global volume of such vessels is scrapped outside these five countries. The SBRI also has a major social impact in that region. After completing sailing life, ships are sold because of reusing valuable steel. In Bangladesh, ship breaking is mainly based on Sitakunda upazila (Bhatiary to Barwalia) which is located at the south of Chittagong, just on the Bay of Bengal. In coastal zone, ship breaking activities are being conducted with both opportunities and threats. Meeting the rising demand for unrefined resources such as steel needs to be fair with the harmful impact this ship dismantling action is having on coastal eco-system and on the living conditions of the workers.

b) Literature review:

We reviewed different secondary sources. Most of the ship breaking industry even association did not comply any international law. Only a limited number of information is available. YPSA has conducted a baseline survey on ship breaking workers the socio economic, accessibility to health, nutrition and WASH is very critical even the most dangerous point was that a large number child labor and 90% workers don't have access to any health facilities. Ship breaking activities are being condemned as the whole process entails a series of risky tasks and as a depot of hazardous risky and harmful substances, which pose threats to the ambient environment and increase the morbidity and mortality of workers life. Below findings are from different secondary sources: Socio economic overview: It was found that majority of the labour (40.75%) are between the

ages of 18-22 years old. Only 1.13% of labour is between 46-60 years old. One of the most disturbing findings was that child labour (under the age of 18) made up 10.94% of the workforce. 46.42% of yard workers are illiterate while 43.02% attained primary school education the most important finding is that 10.94% labour are child. It is clear that young labour force is dominant in this sector which also indicates that less experienced and untrained labour force are forced to accept such jobs mainly due to poverty. Another thing is that the labour above 45 years are very less in this sector because more physical strength is necessary to work here. a huge number of labour (46.42%) are illiterate and 43.02% labour are educated up to primary education. The huge uneducated labour force has less scope for better professional jobs within and outside the sector. Access to health, Nutrition, Water and sanitation facilities: 90.19% labour don't get any medical facilities from the yard, 5.66% labour said they get all medical facilities and 4.15 % labour get medical facilities. There are no arrangements for pure drinking water, healthy food, hygienic toilets and living conditions for the workers. There is no opportunity for healthy food, hygienic toilet and Medical facilities. It was found that the industry-related incidences of skin diseases, backbone pain, gastric problems, urinary problems, chest pains, eyesight problem and headaches were identified and was fatal. Ship-recycling industry of Bangladesh has been in the dominating position since last decades. But the general practice based on the collected information in the dismantling yards has identified the absence of safe working practice and sufficient control mechanism which is the main cause of environmental and occupational health threats.

Environmental situation: scrapped ships have an unladened weight of between 5,000 and 40,000 tons (the average being 13000+), 95% of which is steel, coated with between 10 and 100 tons of paint containing lead, cadmium, organotins, arsenic, zinc and chromium. Ships also contain a wide range of other hazardous wastes, sealants containing PCBs, up to 7.5 tons of various types of asbestos and; several thousand liters of oil (engine oil, bilge oil, hydraulic and lubricants oils and grease). Tankers additionally hold up to 1,000 cubic meters of residual oil. Most of these materials have been defined as hazardous waste under the Basel Convention. In Bangladesh, ships containing these materials are being cut up by hand, on open beaches, with no consideration given to safe and environmentally friendly waste management practices. Ship-breaking activities contaminate the coastal soil and sea water environment mainly through the discharge of ammonia, burned oil spillage, floatable grease balls, metal rust (iron) and various other disposable refuse materials together with high turbidity of sea water. The high PH of the seawater and soil observed may be due to the addition of ammonia, oils and lubricants. High turbidity of water can cause a decrease in the concentration of DO and substantially increase the BOD. The basic construction material of ocean going ships is harmless structural and non-structural steel, but ship dismantling activities may generate lots of other materials like non-ferrous metallic materials, glass and wood, polymeric and composite materials, sludge water, oil, undifferentiated materials as well as dangerous solid substances such as mineral wool like asbestos. So, for a risk free, environmental friendly, economical and energy conserving ship recycling process with comprehensive knowledge of the materials, regarding quality.

Worker right Violation:

- Ship breaking agency or industry did not have maintain and provide occupational health and safety standards equipment's, no training or personal protection equipment provided
- Limited or no access to treatment, emergency services and health benefit when worker is injured or killed even no compensation available.
- Extensive working hours with no right to overtime, sick or annual leave.
- No right to join in trade union and lack of job security
- Minimum wages and no job security

In the majority of the shipyards, workers are being deprived of their rights.

II. Objectives

1) To assess the health status of Ship Recycling Workers (SRW's)
2) To identify pragmatic solutions for reducing the vulnerability of working conditions in Ship Recycling Industry.

III. Materials & Methods

We conducted this study by concerning civil surgeon office during the period from July, 2017 to December, 2017. The aim of our study was to assess the health status of Ship Recycling Workers (SRW's) in these industries. In a country like Bangladesh, health information is rarely collected for population subgroups or occupational hazards in such industries. At first, the team identified the location of different yards. Observation on the activities of labour was done for some days to know the behaviour, leisure time and daily life style. A questionnaire was made including both close and open ended questions to know the overall conditions of the labour, staffs and businessmen. Focus group discussion and Key Informants Interview (One to one interview)

was done to get the answer of the questions. Most of the interviews were taken outside the yards at the break time and at leisure. Some interviews were also taken at night as they become relax at that time. To understand the health status and determine needs of this target population we had to review different studies, literature and some other research publication. Although , There had a few number of documents we reviewed ,we had also collected secondary data source specially hospital records .for Primary data collection, we have considering qualitative approach where we conducted 3 focus group discussion (32 Respondents) with ship building workers, families and others beneficiaries. We had also conducted 8 Key informants interview with Civil surgeon,Upazilla Chairman, UH&FPO, Medical Officer and others Service provider. After collecting data, it was cleaning, coded and analyzed.

IV. Results: Risks & Hazards

Occupational risks

Lack of labour safety is one of the major concerns of present ship recycling industry in Bangladesh. Ship breaking workers are generally unskilled and sometimes, they do not have even any basic training for this risky job. During focus group discussion, they were asked experiencing pains and injuries during or after work in different parts of their bodies. 84% answered that most of their pains including knee, joint pains and headaches were attributable to long hours hauling heavy loads and working in the sun and 35% believed that during this heavy loads, they were affected minor injuries. 90% of the respondents are asked regarding the safety equipment's and standard machineries for absence in their shipyard. Noncompliance of the safety issues during cutting operation causes various kinds of accident. There is no standard sequence of cutting operation. Sometime the sequence is defined by labor themselves and it is varied with ship types, size etc. It is observed that while starting cutting processes, labours usually cut all the side shells at first. During such practice, accident due to fall of plate is very common. Plates are carried away by group of labors without knowing the weight of the plate. Sometime heavy plate weights as well as very sloppy and muddy ground make the plate carrying job very risky. As a result, falling from the height is a very common accident in Bangladesh. During discussion, respondents shared ,Majority of the death coming from fire explosions in oil tankers , secondary data revealed that 49 % death from fire explosion,24% from ship fallen or parts or ship or heavy plate 17.2 % death from toxic gas inhalation , and 7.2% death from fallen from ships. But the important note is that most of the death was prevented if proper precautions like safety equipment, better technology and trainings were used/performed.

While cutting plate, no care is taken about removing coating and usually plates are cut with coating. SRW's are pushed to work in confined spaces with lack of enough safety measure like measurement device, safety suite, and ventilations etc. Cutting operation in the cargo tank without following proper gas freeing and gas monitoring procedures cause serious fire hazards. Many minor accidents like cutting due to sharp edge, bruising etc. have not been reported. Lack of appropriate emergency response, rescue and first aid is also common in ship breaking industry in Bangladesh. Winch or pulley or crane etc are not tested periodically and so there is no way of ascertain their capacity. This put the SRW's in occupational hazards.

Health Problems

Ship-breaking is one of the most hazardous activities of any maritime industry, but most of the workers in ship breaking yards in Bangladesh have no basic knowledge about the impact of ship scrapping on health. As result exposure to asbestos, PCBs, heavy metals and chemicals causes serious health problems of the worker dealing with ship-breaking industry. The workers dismantle asbestos without knowing the consequences of inhaling such materials. They went to their living space without taking shower, thus risking other persons who live with them. Exposure of poisonous paints like Tribtylin (TBT) causes serious health problem in ship-breaking worker's in Bangladesh. During discussion, respondents concerned their health hazards. Mostly they suffered skin diseases, weakness considering nutrition deficiency, arthritic pain, cough & sputum expelled, itching, urinary infections, gastric irritation. Most of the issues are attributable according to health experts to high levels of pollutants like dust and smoke and lack of proper facilities at the yards. Most of the cutter has to work in very intense light of cutting torches. Though, they use goggles, but these PPEs are sometimes not up to mark for heavy duty works like ship breaking activities. Thus workers complained of problems like eye redness, tearing, burning sensation, blurring of vision and conjunctivitis etc after long working hour. Some workers complain of impairment of hearing after working in the harsh environment of ship-breaking industry where excessive noise is present.

Hazards and its major causes: The major health hazard risks at the ship breaking workers from the present study are shown. The observed common hazards of hazards and risks of ship breaking activities are divided into five categories namely, serious accident-related hazards, Physical hazards, Mechanical hazards, Biological hazards and Ergonomic and Psychological hazards on workers as well as residences near the breaking yards studied. Furthermore, the table lists the mechanisms through which the respective hazards take

place. The authors had observed that many factors and issues area correlated with ship breaking accidents at Sitakunda's ship-breaking industrial area:

Category of hazards	Causes or mechanism
Serious accident related hazards	1. Fire and explosion by explosives flammable materials 2. Being stuck by falling materials 3. Compressed between heavy materials 4. Snapping of cables, ropes, chains, slings 5. Handling heavy objects; poor access to progressively dismantled vessels (floor, stairs, passage ways) 6. Falls from height inside ship structures or on the ground 7. Stuck by moving objects 8. Slipping on wet surfaces 9. Sharp materials 10. Oxygen deficiency in confined spaces. 11. Lack of PPE, housekeeping practices, safety signs
Environmental hazards	1. Metallic smell 2. Noise pollution 3. Extreme temperatures 4. Vibration 5. Poor illumination
Mechanical Hazards	1. Trucks and transport vehicles 2. Scaffolding, fixed and portable ladders 3. Impact by heavy an sharp-edged tools 4. Power-driven hand tools, saws, grinders abrasive cutting wheels 5. Shackles, hooks; chains Cranes, winches, hoisting & hauling equipment; 6. Lack of safety guards in machines 7. Poor maintenance of machinery and equipment
Biological Hazards	1. Toxic marine organisms 2. Risk of communicable diseases transmitted by pests, vermin, rodents, insects and other animals that may infest the ship Bitten by insects, snakes and others. 3. Infectious diseases (TB, malaria, dengue fever, hepatitis, respiratory infections etc.) Ergonomic
Ergonomic and pschychological hazards	1. Repetitive strain injuries, awkward postures, repetitive and monotonous work, excessive work load 2. Long working hours, shift work, night work, temporary employment 3. Mental stress, strained human relations (aggressive behavior, alcohol and drug abuse, violence) 4. Poverty, low wages, under age, lack of education and social environment

V. Discussion

A study (Hossain, 2008) on occupational health workers in ship-breaking industry confirmed that most of the workers were found to suffer from multiple disease and health hazard. Abdominal, urinary, muscle and skin problems as well as nutritional deficiency were also identified among the workers which were mainly caused due to toxic metal, oil and chemical contamination as well as excessive workload, long working hour, monotonous works, irregular eating, insufficient diet and unsafe drinking water. Another study, it was found from the surveys that direct physical hazards like Loss and Impact on Body Organs was high at 23.19%, followed by Spot Death (17.39%) and Skin Diseases (15.94%). Also, Gastric Problems were found in 11.59% of the respondents along with Muscle and Chest pain (10.72%), Problem of Eyesight and Headache (8.84%) and Breathing Difficulty, Cold and Cough (7.54%) at the study area. It was expressed by the respondents that especially during the high and moderately high risk activities required different safety equipment's and 92% respondents answered that there were rarely provided by them. Respondents concerned that in the place, there was no such first aid box or medical facilities are available. In recent times many workers were reported to have suffered from fatal injuries or loss of limbs/sensory organs due to this very critical consideration. Respondents also complained for any amputation of organ damaged, Authority did not give any compensation, there has nothing health insurance facilities in there. We discussed with civil surgeon, UH&FPO, Upazilla chairman, Local authority, ship recycling agency or proprietor. Some issues concerned that lack of such type of primary healthcare facilities, negligence of the agency can causes these happened.

VI. Limitations of the study

We conducted this qualitative study to get a hypothetical idea about health status of the workers of this industry by conducting small numbers of FGDs and KIIs. Getting a robust idea, need to conduct study with large number of FGDs and KIIs. However, quantitative study is needed to justify the status more accurately.

VII. Recommendations

Ship breaking industry is one of the most potential industries for the economic backbone of Bangladesh. It is needless to say that it has great impacts on GDP as well. Ship breaking is recognized as one the most hazardous occupations (ILO, 2004). Bangladesh ship breaking industry has both challenges and opportunities with numbers of advantageous parameters specially abundance of cheap labor, technical know-how, shipping experience and expertise, local steel demand and second hand market utility. What is required is the immediate attention of the labor authorities towards these economically important industry workers' occupational health and safety standards. Ship recycling should be looked into with an international perspective. Much needed international co-operation with transfer of technology and information and sharing of responsibilities from various stakeholders is equally important with ongoing local efforts. From the above discussions we would like to recommend some essential points which could increase the safety and health of the workers in Bangladesh.

- Existing laws should be strictly enforced by the government.
- Establish temporary satellite health care in the ship breaking area where emergency medical care is provided.
- Increased their wages as its classified as high risk labour job.
- Regular train up the workers on safety and health hazards
- Develop a well-designed cutting plant, workers safety and environmental issues in high concern.
- Monitor and established that no children is allowed to work here.
- Health coverage or compensation for organ damage if happened.
- Establish trade union to greater interest for the workers.
- Develop a flexible working condition for workers as per the ILO conventions and United Nations conventions on the right of the children.
- The central government should originate and implement a set of national policy and principles for safe and sustainable ship breaking after having consultation with relevant stakeholders.
- Several short and long term scientific studies should be immediately started for the assessment of impacts due to ship breaking activities on coastal water, soil and fishery resources as well as human health.
- Before a gas-free certificate is being issued there should be a systematic and integrated inspection of the whole ship.
- A systematic and periodic inspection of the whole yard should be done before a certificate of compliance is issued by the Department of Environment (DoE) for control of pollution during ship breaking.
- Certain isolated and protected scrapper's yard should be selected for dismantling of ships instead of the seashore areas.
- Effective Environmental Management Plan (EMP) should be introduced for maximum pollution abatement.
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VIII. Conclusion

Bangladesh is emerging as the second largest ship breaking nations in the world in 2013. Bangladesh has shipping experience and good expertise in Maritime Education and Training so now with potentials for better sustainability, the industry needs logical support both internally and externally in various aspects such as technical, human oriented, organizational and financial. Moreover, regular health and hazards inspection of the sites to establish sustainability of the regulations are essential. Also, training and awareness programs for the workers will help them raise their voices against being exploited. It is possible to turn ship breaking industry into a safe and green industry by taking necessary steps. To uphold position in world ship breaking industry, there is no other alternative but to comply with the Hong Kong Convention rights. The country must upgrade the infrastructure for upstream and downstream waste management, and health issues of the workers. The industry does need to start up the process right now; otherwise it might lose the business of ship recycling in the near future.

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