***Original Research Article***

**Evaluation of occupational health and hygiene conditions of retailers in a fish market in the southern region of Bangladesh**

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ABSTRACT

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| **Aims:** The ~~hygenic~~ hygienic condition of fish markets and retailer health safety plays a crucial role in maintaining fish quality and consumer health perspective as well. This study was designed to address the health condition of fish retailer and their awareness regarding this. The study was conducted in two important fish markets situated in Noakhali, Bangladesh.  **Methodology:** Information was collected through questionnaire interviews and participatory rural appraisal (PRA) from the retailers(space)(n= 30)  **Results:** The retailers are mainly involved in selling various species of fresh\_water (remove space, keep same format) and marine water fishes like as carps, catfishes, anabas, tilapia, koi, hilsa, shrimp and other small indigenous fishes. Here, fish~~es~~ were mainly sourced from ponds (60%) but rivers and sea (40%) are also the sources of fish~~es~~. About 27% of the retailers had no basic education, 60%, 13% had primary level and secondary level of education. Though many of them were literate, their knowledge and practice about public health, hygiene and sanitation was found to be very poor. Lack of proper preservation, ice and transportation facilities, a noticeable amount of fishes are losing their quality. Besides, about 20% of the fishermen did not use ice ~~that~~ which may cause deterioration of the quality of fish and health problems ~~of~~ for the fishermen. They were found to be infected by various diseases such as common cold (cough, coryza etc.), Diarrh~~o~~ea, lesions on different portions of the hand and legs, skin disease and knee pain ~~.~~ , tip fingers, between toes, on the nail and tip of toes and skin disease on legs, respectively.~~.~~  **Conclusion:** Therefore, the proper education and training on hygienic and sanitary conditions, as well as sufficient knowledge on maintaining fish quality, ~~is~~ are required for retailers involved in fish retailing in the markets |

***Keywords:*** *Hygiene, Fish retailer; Occupational health; Bangladesh*

1. INTRODUCTION

The fisheries sector is one of the most productive and dynamic industries, which has a tremendous potential for future development in the agrarian economy of Bangladesh. In Bangladesh, fisheries resources ~~which~~ are broadly categorized into inland fisheries and marine fisheries. Inland fisheries cover an area of 47.60 lakh ha, which has two sub-sectors, i.e., inland capture and inland culture (FRSS, 2017). Fish are originally gathered from natural water sources, but as a result of numerous environmental and other manmade factors, their numbers have dropped dramatically over time. Fishing is important for supporting livelihoods worldwide and also forms an important source of diet for one billion people. The fishing business is a crucial sector of many countries of the world from the standpoint of income generation and employment generation. The fisheries sector plays an important role in the economy of Bangladesh by contributing to the national income, employment, and foreign exchange. Presently, the marketing system of our country is important because it is often considered to be a limiting factor for fisheries development (Rahman, 1997).

In Bangladesh, fish landing center is almost exclusively ~~a~~ the private sector where the livelihoods of a large number of people are associated with fish production and marketing systems. Higher transport cost, poor roads and transportation facilities, insufficient ice supply, exploitation by middlemen, inadequate drainage system, poor water supply, poor sanitary facilities, unhygienic conditions as well as poor infrastructure were the common constraints of the fish marketing (Akter et al. 2010). Infrastructural facilities, especially fish landing centers are inadequate and unhygienic, often posing serious threats to public health. Because of the increasing population, it has been found that the number of fish markets is growing dramatically. The fish market in our country is virtually a cluster of disorganized activities and always remains in the control of influential persons of the surrounding~~s~~ area, depending on a wide range of social, economic and political factors. According to Krishnaiah (2011), the fish markets were commonly filthy and unhygienic. The(remove extra space) fish markets are often characterized by wet and slimy flooring, foul smell, deposits of fish wastages, improper drainage, presence of flies, dogs etc. High levels of noise and cacophony are symbolic of a fish market. The infrastructural facilities including fish landing, preservation or processing, wholesaling, or retailing often pose~~ing~~ serious threats to public health because of inadequate and unhygienic operation system. However, the most severe marketing difficulties seem to occur in remote communities including lack of transportation~~ing~~ systems, ice~~ing~~ facilities, and poor road facilities.

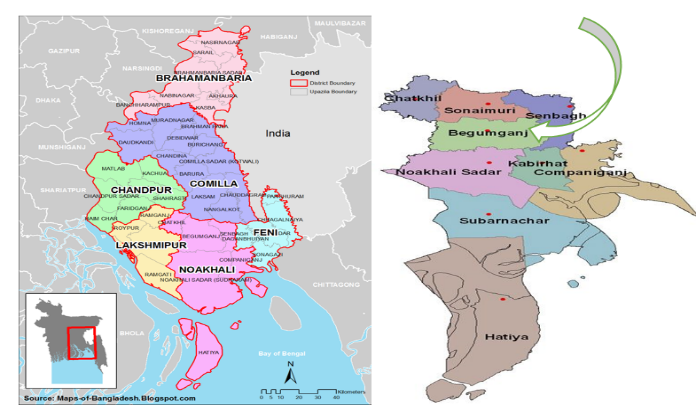
Public health promotes and protects the health of people and the communities where they live, learn, work, and play. It is concerned with threats to health based on population health analysis (Cuter and Miller, 2005). It begins with personal hygiene as it helps in preventing diseases, besides promoting community health and prolonging life. Communicable diseases are still the major diseases in Bangladesh. Mortality and morbidity due to these diseases are very high. Infectious diseases are still the major diseases in Bangladesh. Mortality due to these diseases is very high. Infectious diseases like cholera, typhoid, tuberculosis, leprosy, tetanus, measles, rabies, venereal diseases and parasitic diseases like malaria, filariasis, and worm infestations are responsible for major morbidity (Nickson et al., 1998).

Compared to the general public health situation in terms of sanitation, the drinking water supply has been improved a lot in Bangladesh. But the existing situation of public health of fish market stakeholders, particularly of retailers has not been developed yet although those issues are closely related to the fish quality as well as consumers and retailer’s safety. Those issues are closely related to fish quality and consumer~~s~~ safety. Considering the above facts, the present study was carried out to understand various issues of public health being faced by the fish retailers, socioeconomic condition of retailers and also to observe~~d~~ the awareness of retailers and purchasers about hygienic condition of the market. Chowmuhani Bazar is a lively traditional market a key commercial area in the Greater Noakhali region of Bangladesh which is a busy hub for both fresh and dry fish markets (Rajon et al. 2022). The study will describe the hygienic conditions and public health of retailers fish retailler of this market. (correct it).

2. material and methods

**2.1 Study area**

The study was conducted based on a market survey for obtaining information through a sample survey of the fish retailers. The survey was done in the two important markets situated at Chowmunani bazar and Chowrasta bazar in Begumganj Upazila of Noakhali. A ~~the~~ sample of 30 fish retailers were interviewed from two fish markets. Chowmunani bazar and Chowrasta bazar in Begumganj Upazila of Noakhali and nearby area. To achieve the objective of the study, an extensive interview schedule was used to collect data. Also, for an in-depth interview a guideline of questions were used to keep the respondents on track.

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**Fig 1 Study area**

**2.2 Data collection**

For data collection, a questionnaire was prepared in accordance with the objective that’s set for the study. Before preparing a questionnaire, a draft questionnaire was developed and pre-tested in the study area. After that, the questionnaire was finalized associated with necessary changes and modifications as per the opinions of the retailers during pre-testing. Then final questionnaire was developed in the logical sequence so that the target group could answer chronologically and confidently without hesitation. The primary data were collected through market survey by using a well structur~~al~~ed questionnaire. Data were assembled both by physical~~ly~~ observation and interviews with the retailers. Data were collected on various aspects of the hygienic condition of the retailers and a market survey was conducted in Chowmuhani Bazar and Chowrasta Bazar. (remove extra space) A range of Participatory Rural Appraisal (PRA) tools such as, focus group discussion (FGD) was conducted with retailers. FGD was used to get an overview of particular issues such as health problems, sanitation and hygiene conditions.

In this study, both qualitative and quantitative data were collected. Primary data were collected by using questionnaire interview from retailers and market~~s~~ visits. Secondary data were collected from different research papers, literatures, books and different websites and so on. After each visit collected data were checked for accuracy and clarity of the study. Here, relevant information on the health and hygiene condition of retailers ~~were~~ was collected from books, thesis papers, journals and local MBBS doctor. After the collection of data from the field, data were verified to eliminate errors and inconsistencies. Then the data were tabulated carefully. The qualitative data were categorized and analyzed mainly based on descriptive statistical analysis using MS E~~e~~xcel. All the collected data were processed and analyzed to extract the findings of the study area following careful accumulation.

3. results and discussion

**3.1 Sources of Fish and Transportation System**

This study shows the operation of a local fish market, with an emphasis on fish supplies, the retailer's transportation system, and ice management. The quantitative data, obtained from an exact sample of 30 fish retailers (N=30), the sources of fish are mostly freshwater habitats. Aquaculture provides the main source, providing 18 out of 30 retailers (60%) with their fish. This data shows that this market is mostly of aquaculture or localized pond fishing operations in the supply chain. The transportation system reveals that Pickup was the most popular mode, used by 40% of retailers (Table 1). The rickshaw was the least popular mode, employed by only three retailers (10%), which indicates outside road communication system has been developed. Finally, the data on ice gives a clear picture of cold chain management strategies. 80% of retailers use block ice for fish preservation. In contrast, six out of thirty retailers found that they did not use ice. This study shows that the fish market is predominantly supplied by inland aquaculture and freshwater fishing. However, the least proportion of fish sellers do not utilize ice, which undoubtedly reduces the quality of the fish and causes health problems for consumers. though most of the retailers use ice for conservation, their fish and ice ratio is not properly maintained. On the other hand, sometimes use polluted water, which causes fish deterioration and makes unhygienic conditions in the selling zone. A few fish dealers store fish in water to keep them cold and free of contaminants.

**Table 1: Different scenarios considered in the fish market**

|  |  |  |  |
| --- | --- | --- | --- |
| Scenario | Medium | Number ~~O~~of Fish Retailers  N= 30 | Percentage (%)  N= 30 |
| Sources of Fish | Pond  River  Sea | 18  09  03 | 60  30  10 |
| Transportation System | Pickup | 12 | 40 |
| CNG | 09 | 30 |
| Van | 06 | 20 |
| Rickshaw | 03 | 10 |
| Ice Use | Block Ice | 26 | 80 |
|  | No ice | 6 | 20 |

**3.2 Common health diseases seen among the retailers**

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| --- | --- |
|  |  |

**Fig 2 Disease found among the retailers and also percentage of cold disease**

In this study, it was found that retailers person affected by various diseases. Most of the cases are cough, which is 54%, (**Fig 2** ) lesion on hand (87%) (**Fig 2** ). Results also indicate that 87% of total retailers were affected by any kind of cold disease. It indicates that their health and hygiene conditions are very poor. The common cold (known as nasopharyngitis, coryza, simply a cold) is a viral infectious disease of the upper respiratory tract that primarily affects the nose.

**3.2.1 Cough**

A cough is a sudden occurring reflex which helps to clear the large breathing passages from secretions, irritants, foreign particles and microbes. cough can be a symptom of various conditions, including the common cold, bronchitis, and other respiratory infections. It was observed that about 54% of fish retailers were affected by cough (**Fig 2** ). It is indicative that the market\_(remove space)place most unhygienic and polluted water.

**3.2.2 Coryza**

According to the MSD veterinary manual, coryza is an acute, contagious bacterial respiratory disease primarily affecting chickens, characterized by nasal discharge, sneezing, and facial swelling. It was another important common cold disease that affected 23% of the fish retailers, 13% both diseases, and 10% were not affected by any disease retailers observed in the study (**Fig 2 )**

**3.2.3 Diarrh~~o~~ea**

It is a common cause of death in developing countries and the second most common cause of infant deaths worldwide (UNICEF/WHO, 2009). Diarrhea (keep spelling same for whole manuscript of Diarrhea) was reported to be a very common disease of fish retailers under this study. According to the survey, about 10% of fish retailers were affected by diarrhea in a calendar year (**Fig 2** ). This was because the majority of fish retailers did not wash their hands properly, sometimes they washed their hands only with water without soap. There are many causes of infectious diarrh~~o~~ea, which include virus, bacteria and parasites. Retailers’ hands were observed to be dirty with clay, slime etc., which was supported to bear various bacteria, virus, fungi and other protozoans which could come from fish. According to Viswanathan *et al.* (2009) *Campylobacter* spp. are the common cause of bacterial diarrhoea, but infections by *Salmonella spp*., *Shigella spp*. and some strains of *Escherichia coli* are also very frequent.

**3.2.4 Lesion**

A lesion is any abnormality in the tissue of an organism (in laymans terms, “damage”), usually caused by diseases which was found to the retailers in various forms. It was aggravated by secondary infection through fungus. Hands were found to be turned into whitish color, causing further lesion on other portion of hands. Some bacteria might have grown in that lesion which might be transmitted to other stakeholders from the fish sold.

**Table 2: List of lesions in different parts of the body among the retailers**

|  |  |  |
| --- | --- | --- |
| Lesions | No. of retailer | Percentage |
| lesion on hands | 14 | 47% |
| Lesion between fingers | 10 | 33% |
| Lesion on the tip of fingers | 2 | 7% |
| Lesion between toes | 3 | 10% |
| Lesion on the nail and tip of toes | 2 | 7% |

The table indicates that Lesion on hands, which affects 14 retailers and makes up a significant 47% of the total. The hands are the main area doing their work and are vulnerable. Hands are in direct touch with fish, ice, water, and sometimes sharp fins or bones because of the nature of retail fish handling. Cold temperature and a small cut on~~f~~ the finger is ideal for lesion, irritation, and possible infection. Lesion between fingers is the next most common type after hand lesions, affecting 33%. This highlights the hand's vulnerability even more. For other forms of lesions, the percentages are smaller but still significant. While lesions on the tip of fingers and lesions on the nail and tips of toes each affect retailers by 7%, lesion between toes affects only 3 retailers.(Please make proper spacing in whole manuscript) Lesions on the feet imply that the working environment is not hygienic, wet, and polluted by microorganisms. Similar lesions in hands, retailers sometimes stand in damp conditions for extended periods, and there is no proper footwear on the feet. Lesson significance ranged from the retailer to the customer.

**3.2.5 Skin disease on legs**

The fish retailers of the studied market got diseases on their legs. It was observed that nearly 13% of fish retailers were affected by skin disease in their legs (Figure-2 keep “Figure or Fig” same for whole manuscript). Due to wet conditions, this disease occurred. Fu~~a~~rther, secondary infection caused by fungus. The skin was seen to be damaged which has been reported to turn into a whitish and blackish color.

**3.2.6 Knee pain**

Besides other common diseases, nearly 37% of the fish retailers suffered from knee pain as they have to handle ~~the~~ life, wet and iced fish throughout the day and sit~~eated~~ for a long time (Figure-2). Most of the time, some retailers sold fish though stand and deliver to the consumers. For that, they faced knee pain ~~in~~during their working~~ed~~ time. Mainly old and middle aged groups ~~were~~ faced this type of problem.

**3.3 Health facility and Hygiene maintenance**

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. This study ~~was~~ observed that~~’s~~ about 63% of the population in the study area was dependent on village doctors, while 20% and 17% ~~go~~ used health services from Upazila health complex and MBBS doctors.

**Table 3 Hygiene maintenance percentage among the retailers**

|  |  |  |
| --- | --- | --- |
| Hygiene Character | Number ~~O~~of Fish Retailers  N= 30 | Percentage (%)  N= 30 |
| Washes hand after urination: | 26 | 87 |
| Washes hand after toilet use: | 22 | 73 |
| Source of washing water  Pond water  Tube well water | 21  09 | 70  30 |
| Washing frequency   * Once * Twice | 23  07 | 77  23 |

Table 3 reflects that the majority of retailers said they practiced basic hand hygiene, with 87% saying they washed their hands after urination and 73% after using the restroom. This number sounds good, but in most cases, they use only water rather than using sanitizer or soup. This unhygienic situation creates several problems for their health and also pollutes the market area   
  
However, more thought should be given to the sources and frequency of water used for washing. The most common source, used by 70% of retailers, was pond water, which was much more common than tube well water 30%. Pond water increases the disease transmission and causes consumer and retailer health issues, especially if these water sources are not properly managed to reduce contamination. Hand washing matters. Most retailers, 77% washed once, whereas only 23% washed twice. This frequency could be the result of limitations in their awareness of overall cleanliness. Frequent washings are usually advised for cleanliness in fish handling situations.

**3.4 Socio Economic Conditions of Retailers**

**Table 4 Socio Economic Conditions of Retailers**

|  |  |  |
| --- | --- | --- |
| Indicator | Number ~~O~~of Fish Retailers  N= 30 | Percentage (%)  N= 30 |
| Age Structure (years)   * 15-30 * 30-50 * 51+ | 10  14  **06** | 30  50  **20** |
| Education Level   * Illiterate * Primary Level * Secondary Level | 09  18  03 | 30  60  **10** |
| Occupation   * Primary * **Secondary** | **23**  **07** | **77**  **23** |

In this study, fish retailers were categorized into three categories based on level of education which is similar to the findings of (Zaman *et al.,* 2006). In terms of age distribution, the majority of retailers, half of the total sample, are in the 30 to 50 years old age range. Retailers between the ages of 15 and 30 make up 30%, and the lowest group is made up of those 51 years above older. This represents that most of the people are young and in ~~of~~ this sample and serving fish retailers’ work.

A majority of retailers 60% have completed an elementary school education. Illiterate retailers account for 30% of the sample, with only 10% having completed secondary schooling. The educational data show primarily less educational knowledge among the retailers. The minimal proportion of retailers with secondary education may indicate that people with greater educational degrees choose alternate career routes, or that the nature of fish retailing does not require extensive formal education. The majority of the people in ~~of~~ the rural area adopt agriculture as their main occupation. Most of the fish retailers in the study area, whose main source of income and livelihood was either fish selling or agriculture (Haque *et al.,* 2014). The vast majority of retailers 77%) are in primary occupations, and Secondary occupations have a lower amount, 23%. The occupational distribution strongly suggests that fish retail is the predominant source of income for those individuals. Most of the retailers carry on their daily lives through fish retailing. Overall, the socioeconomic conditions reflect that most of the retailers are illiterate, and it's their main source of income. Education is one major issue in realizing the hygiene and health issues. Overall, these socioeconomic variables give a foundational understanding of the demographic and educational environment of the fish retail community, which can inspire targeted interventions and policies aimed at improving their lives and business operations.

**4. Conclusion**

The study identified serious health problems of the retailers through direct observation. However, the microorganisms causing the infections were not identified in this observation. Maintaining a sanitary environment in fish markets is critical for the successful marketing of high-quality, safe fish and fishery products. the study emphasizes that poor conditions, inadequate infrastructure, and a lack of hygiene knowledge in these markets. Which is a significant concern. This concern requires a comprehensive approach that includes upgrading market infrastructure, educating people and sanitary practices, and raising health awareness. To improve and develop the marketing channel, physical marketing facilities must be improved to make the entire marketing system sanitary. Proper cleanliness must be maintained in fish handling areas to prevent contamination and loss of quality. Hygienic practices serve to avoid or reduce fish deterioration, contamination, and microbial growth. As a result, GO and NGOs should step forward and take the required steps to eliminate the limits of fish trading and improve their livelihoods. However, government officials' power over domestic markets is irregular.

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