****

**KNOWLEDGE, AWARENESS AND RISK OF ZOONOTIC DISEASES AMONG LIVESTOCK FARMERS IN CHATTOGRAM DISTRICT, BANGALDESH**

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Roll No: 0118/08

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**A thesis submitted in partial fulfillment of the requirements for the degree of Masters in Public Health**

**One Health Institute**

**Chattogram Veterinary and Animal Sciences University**

**Chattogram-4225, Bangladesh**

**February, 2021**

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Sharmin Akter

February, 2021

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**This is to certify that we have examined the above Master’s thesis and have found that is complete and satisfactory in all respects, and that all revisions required by the thesis examination committee have been made**

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**February, 2021**

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**Symbol and Abbreviation**

CVASU: Chattogram Veterinary & Animal Science

 University

Etc: ET cetera

FAO: Food and Agriculture Organization

FMD: Foot and Mouth Disease

kg: Kilogram

km: Kilometer

mm: Millimeter

TB: Tuberculosis

Sq: Square

WHO: World Health Organization

%: Percentage

$℃$: Degree celcius

>: More than

<: Less than

# Abstract

A cross-sectional study was conducted to assess the level of knowledge, awareness, and risk of zoonotic disease among livestock farmers in the Chattogram district. Data were collected conveniently from 100 livestock farm owners by using a semi-structured questionnaire consists of close and open-end questions related to various aspects of farm management and zoonotic disease. Collected data were then analyzed and divided into categories and summarized. This study shows that most of the farmers who participated in this study were male (94%) who obtained only primary (45%) or no (17%) education. A majority (85%) of farmers owned a medium-size herd who relied solely on farming business as their main income source (62%). Although 77% of animal sheds were located distant from the residence, none of the farmers imposed any restriction on visitor access to the farm. A majority (97%) of farmers added new animals to the herd without any health check-ups. In the case of dead animals, 74% of them were buried deep and 26% were thrown in the canal. Most (51%) of the farmers use dumping sites for disposal of waste while 32% threw waste in open water and 17% used regular sewage systems for waste disposal. Among the respondents, only 22 % respondent was partially aware whereas 78% did not know about possible transmission of disease from dairy animals to farmers and vice versa. This study found that FMD and rabies were the most well-known zoonotic disease whereas brucellosis was the lesser known among all farmers. Anthrax was mentioned by 85% of respondents while none of them mentioned brucellosis as a zoonotic disease. Most farmers were familiar with FMD (100%), anthrax (5%), and rabies (46%) vaccines while none of them heard about the brucellosis vaccination program. Only 7 and 12% of respondents had training on biosecurity and farm management. This study concluded that there are various risk factors associated with the occurrence and spread of zoonotic disease in the targeted farms. Moreover, lack of education, proper training on-farm management and biosecurity may contribute to the poor level of knowledge and awareness related to the potential risk factors associate with the different zoonotic diseases among livestock farmers in the Chattogram district.

**Key words**: zoonotic diseases, knowledge, awareness, risk factors, semi-structured questionnaire, livestock farmers.

# **1.0 Introduction**

Zoonotic diseases are the natural transmission of infections from vertebrate animals to humans via bacteria, viruses, rickettsia, fungi, helminths, protozoa, arthropods, etc. In humans, 60% of infectious agents are considered zoonotic (Daszak *et al*., 2000). Recently, the global community becomes more concerned about zoonotic disease due to its negative impact on public health and the economy (Munisamy *et al,* 2017).Moreover, zoonotic diseases negatively affect the production performance of animals and the safety of the products (milk, meat, egg, wool, etc.)(Kang'ethe *et al.,* 2012).

People can get infected with germs in many ways that can cause zoonotic disease. These include- direct or indirect contact with infected animals and their discharge (saliva, blood, urine, mucous, feces, or other body fluids, etc.). Besides, the zoonotic disease can spread through inhalation, consumption of infected food (milk, meat, water), the bite of tick or insects, or contact with infected surfaces like pet habitats, chicken coops, barns, plants, soil, as well as pet food and water dishes (Klous *et al.,* 2016).

The relationship among humans, animals, and the surrounding environment is very close in many developing countries, where animals offer transportation, draught power, fuel, clothing, and source of protein in the form of milk, meat, egg. Due to a lack of proper knowledge, this linkage can lead to a serious risk to public health with huge economic loss (Babu *et al*, 2015).

In Bangladesh, agriculture, livestock production, and livestock breeding, etc. are the prime sources of food production for the people leading to a strong interaction between animals and humans. Due to the lack of knowledge and awareness regarding zoonotic diseases, the majority of the livestock farmers and farm animals are at high health risk (Chowdhury *et al,* 2018) to contact with the zoonotic disease. The rise of the livestock industry in the last few decades especially in urban and suburban areas poses a significant threat to human health. Zoonotic diseases can be transmitted from animal to human by direct contact with the animal or by handling contaminated animal products during production and processing (Rajkumar *et al*, 2016).

The impact of zoonotic diseases is more destructive in developing countries than developed countries. The farm management techniques, educational background, food habits, sanitary and hygienic awareness during handling of animals, awareness about disease control programs can contribute to the occurrence of zoonotic disease in developed countries (Asbjer, 2009). A study showed that the farmers (28.06%) of Andra Pradesh, India (Babu *et al.,*2015) and Sylhet, Bangladesh (47.83%) did not know about the zoonotic disease (Chowdhury et al., 2018). In different studies, it was observed that farmers were very reluctant or negligible to follow the hygienic procedures during and after handling of animals or processing of animal products (Babu *et al.,*2015; Chowdhury et al., 2018), thus increasing the possibility of zoonotic disease occurrence. Besides, the poor educational background of farmers could limit their perception or awareness toward zoonotic disease transmission (Girma *et al.*, 2012;Cakmur *et al*, 2015).

Zoonotic diseases can be diagnosed, prevented, and treated by raising awareness among the people. Currently, there is little information regarding the perception, knowledge, and risk of zoonotic diseases among the smallholder livestock farmers of Bangladesh. Therefore, the objective of this study was to assess the level of risks, knowledge, and awareness about zoonotic diseases among the small-holder livestock farmers in some of the suburban areas of Chattogram, Bangladesh.

## **1.1 Relevance of the current study**

Many people in the rural areas of Bangladesh are directly involved in livestock and poultry farming. They rear livestock and poultry either commercially or as a small-scale family business. Farmers who are involved in rearing livestock and poultry hardly maintain any standard hygiene procedures at the time of interaction with animals. There is a huge knowledge gap regarding the biosecurity and standard hygiene practice in rearing livestock and poultry among the farmers. Besides, most of the livestock farmers in Bangladesh are uneducated and have no idea about the zoonoses. Their lack of knowledge regarding the risk associated with zoonoses can play a key role in the occurrence and spread of different zoonotic diseases. The lack of awareness related to zoonoses is also the main constraint in the prevention and control of zoonotic disease. To the best of our knowledge, there is no study has been done yet to assess the knowledge and awareness level of zoonotic disease among farmers in the Chattogram division. Such study is therefore very important to execute the prevention and control strategies for different zoonotic diseases. Therefore, this study is aimed to fulfill the knowledge gap regarding farmer’s knowledge and awareness towards the occurrence of zoonotic disease and its relationship with biosecurity and standard hygiene practice.

## **1.2 Research Question**

What is the status of knowledge, awareness, and risk of zoonotic disease among livestock farmers in Chattogram?

## **1.3 Objectives**

### **1.3.1 General Objective**

To assess the status of knowledge, awareness and risk of zoonotic disease among livestock farmers in Chattogram.

### **1.3.2 Specific Objectives**

* + 1. To assess the risk factors associated with farm activities and farm management.
		2. To evaluate the knowledge and awareness of the zoonotic disease among livestock farmers in Chattogram.
		3. To evaluate how socioeconomic status influences the level of awareness of the zoonotic disease among livestock farmers.

# **2.0 Literature Review**

## **2.1 Introduction**

The Zoonotic disease has a great impact on the livelihood of livestock farmers by affecting their health and causes huge economic loss by reducing the quality and quantity of animal products. Among the infectious agents of human beings, 60% of them are shared with another vertebrate animal (Daszak *et al*, 2000). Veterinarians are concerned with infectious agents causing foodborne disease outbreaks such as Salmonellosis, E. coli, and Listeriosis. Moreover, other zoonoses like Rabies, Bovine Tuberculosis, Toxoplasmosis, Brucellosis, Cysticercosis, Hydatidosis, Taeniasis, etc. are drawing the attention of veterinary public health experts (Babu *et al*, 2015)).

Zoonotic diseases may be transmitted to livestock farmers through contamination during the production, processing, and handling of food products of animal origin. Risk factors associated with zoonotic disease are working with diseased animals, skinning, slaughtering of infected animals, contaminated food products of animal origin, lack of knowledge and awareness about hygiene (Hundal *et al,* 2016). People who are in close contact with animal or animal products such as livestock farmers, abattoir workers, people who assist animal birth, veterinarians are at risk of developing the zoonotic disease.

## **2.2 Demographic and socio-economic factors related to zoonotic disease occurrence**

### **2.2.1 Age**

Different demographic and socio-economic characteristics of the livestock farmers are found to be associated with the knowledge, awareness, and risk of zoonotic disease. In most of the studies, most of the respondents were in the middle (35-50 years) age group (Narhari, 2018; Munisamy *et al,* 2017; Rajkumar *et al,* 2016; Chowdhury *et al,* 2018). On the contrary, Hundal *et al.* (2016) observed that age had no significant effect on the knowledge and awareness level of farmers toward zoonotic diseases.

### **2.2.2 Gender**

There was male predominance in most of the studies (Munisamy *et al,* 2017; Rajkumar *et al,* 2016). Interestingly, Chowdhury *et al*. (2018) reported that there was equal representation from both genders (52% male and 48% female) among smallholder livestock farmers in suburban areas in Bangladesh. The gender of the individuals did not show significant differences in knowledge, attitude, and practice regarding zoonotic diseases (Çakmur *et al.,*2015).

### **2.2.3 Educational qualification**

The educational level of the respondents differs concerning the different areas of the world. Studies conducted in and around our country (Chowdhury *et al*, 2018; Rajkumar *et al*, 2016; Narhari, 2018) reported a lower educational level (illiterate or primary level) among the respondents. The education level of most of the farmers (77.6%) was up to secondary or higher secondary, whereas only 13.6% of farmers were having a higher qualification (Hundal *et al*, 2016). However, educational qualification did not affect the knowledge and awareness level of farmers toward zoonotic diseases significantly (Hundal *et al*, 2016; Çakmur *et al*, 2015).

### **2.2.4 Occupation**

Narhari, (2018) reported that 56.87% of respondents were involved in agriculture and dairy farming simultaneously and 43.13% were involved in other businesses along with agriculture and dairy farming. Chowdhury *et al.* (2018) found that 34.78% of the respondents were involved only in dairy farming; others do it as a side business (21.74%) and for family nutrition (43.48%). Another study (Munisamy *et al.,* 2017) revealed that 30% of respondents mentioned dairy farming as the main business for their livelihood while 70% of respondents included agriculture along with the dairy farming business.

### **2.2.5 Income**

Previous study (Narhari, 2018) stated that the annual income of 12.50%, 61.25%, and 26.25% of the dairy farmer was low (<320000 Indian rupees), medium (320000 to 660000 Indian rupees), and high (>660000 Indian rupees) respectively. According to Munisamy *et al.* (2017), among the dairy farmers around 37% of farmers were in the lower-income group (<50000 Indian rupees), 56% were in the middle-income group (50000-1000000 Indian rupees) and 7% were in the higher- income group (>100000 Indian rupees). The monthly income of 79.2, 16.4, and 4.4 % of the dairy farmer were < 10000, 10000-20000, and > 20000 Indian rupees respectively (Rajkumar *et al.,* 2016). Among the dairy farmers in Bangladesh, 43.48%, 34.78%, and 21.74% of farmers showed low (5000-100000 taka), medium (11000-30000 taka), and high (>30000 taka) respectively (Chowdhury *et al.,* 2018).

### **2.2.6 Herd size**

Herd size (total number of cattle and buffaloes owned by the respondent at the time of investigation) varies among the studies. Chowdhury *et al.* (2018) found that majority of the farmer (69.57%) had 2-6 animals in the herd. Narhari (2018) observed that 30.63%, 44.37%, and 25% of the livestock farmer had small (< 17), medium (17-31), and large size herd (> 31) respectively. Munisamy *et al.* (2017) found that the number of cows on the farm was less than 5 among 53% of the livestock farmer.

## **2.3 Biosecurity**

Cakmur *et al.* (2015) reported that majority of the farmer (98.7%) aware of hand washing but was practiced by 91.4% of the farmer. Similarly, 92.1% of the respondent considered that using gloves is necessary while handling the animal, but only 35.8% practiced it. Most of the farmers (84.1%) knew that masks should be used but only 6.6% followed it. The majority (89.4%) of the respondent knew that boot should be used while working on a farm, but the boot was used by only 42.4% of the respondent. The majority (80.1%) of the respondent considered that the dead body of the sick animal should be deeply buried, but it was practiced by only 22.5% of respondents. The majority (88.1%) of the farmer knew that contact with scary hands should be avoided, but 53.6% of them practice it positively.

Rajkumar *et al.*(2016) found that 30% of dairy farmers had a history of abortion in their farm animals. Similarly, Tebug *et al.* (2015) stated that 70.3% of the livestock farmer did not use gloves while assisting their animals during calving and abortion. It was found that the house was located near the animal shed in the case of 43% of livestock farmers and far away from the house in the case of 57% of the livestock farmer. Washing hands with soap was practiced by all of them. The water source was common for humans and animals in 91.30% of the livestock farmer and separate in 8.70% of the livestock farmer. Children were allowed in an animal shed among 69.56% and not allowed among 34.78% of the livestock farmer. Around 47.83% of the livestock farmer did not allow any visitors in the animal shed. Milk quality was checked by 47.83% and not checked by 52.17% of the dairy farmer. Most of them (86.96%) of the livestock farmers use smoke/net/spray for protection against the mosquito Chowdhury *et al.*(2018). Another study (Munisamy *et al.,* 2017) reported that 36.8%, 18.4%, 31.5%, and 76.3% of dairy farmers used gloves, face masks, boots, and caps while working on a farm. Around 78% of the farmer practiced hand wash with disinfectant.

## **2.4 The risk factor associated with farm activity**

Rajkumar *et al.,* (2016) found that 61.2% of dairy farmer regularly washed their animal shed. Babu *et al.*(2015) revealed that all the participants washed their animal shed without using a disinfectant. All the farmers cleaned the udder of a cow before milking without using any disinfectant. Around 69.6% of respondents drink raw milk and 3.6% eat raw meat. About 30% of farmers sleep in animal sheds and 36.8% of farmers apply cream of raw milk on lip cracks. Fourteen percent of livestock farmers conducted brucellosis and tuberculosis test before buying the animal. Hand milking was done by 80.4% of the farmer (Hundal *et al,* 2016).

It has been reported that 55.6, 67.2, 52, 64 and 51.2% of the dairy farmer was aware that zoonotic diseases can transmit through contaminated milk, meat, air, feed, and contact with an infected animal, respectively. Cakmur *et al.* (2015) observed that 84.8% of the dairy farmer knew that boiling milk is necessary but only 57% of them boil milk before consumption. More than two-thirds (82.1%) of the farmer knew that milk should be boiled before making cheese but 55% of them made cheese without boiling milk. Around 84.1% of the farmer considered that eating meat without cooking should be avoided, though 23.8% of them eat meat without cooking. Tebug *et al.* (2015) revealed that 95% of the livestock farmer consumed milk without boiling, which may increase the risk of zoonotic disease. Chowdhury *et al.* (2018) found that disinfectant was not used to clean the animal shed by 69.57% of the livestock farmer and was used by only 30.43% of the livestock farmer. 65.22% of the farmer used a common vessel for feed and drinking water while 34.78% of the farmer used separate vessels. Before milking, udder was cleaned by 86.96% of the dairy farmer and not cleaned by 13.04% of the dairy farmer. Most of the livestock farmers (69.57%) disposed and drained the waste of their animal farm in the regular sewage line, whereas 13.04% and 17.39% disposed of it in an open water body and dumping site respectively, which was distant from their animal farm. Munisamy *et al.*(2017) reported that 64% of the farmers used disinfectant to clean their animal shed and 59.3% of the farmers cleaned the shed two times per day with disinfectant.

## **2.5 Knowledge and awareness about zoonotic disease**

Rajkumar *et al.* (2016) stated that 16.4% of the livestock farmer was aware that some diseases can be transmitted from animals to humans. Brucellosis, TB, Anthrax were known to 4.8%, 3.6%, and 6.8% of the farmer respectively. Among the 18% of the respondent who had contracted the zoonotic disease, 37.7% suffered from a respiratory infection, 31.1% digestive problems, 15.5% skin problems, 15.5% had a history of fever, body ache, headache, joint pain. Tebug *et al.* (2015) found that 30.1% of the respondent knew about zoonotic disease and only 6.8% of the respondent had knowledge about the transmission mode of zoonotic disease. Babu *et al.* (2015) reported that only 28.06% of the participant was aware of zoonotic disease. The fact that transmission of zoonotic disease through milk and meat consumption occurs was known to 14.10% and 18.58% of the participant respectively. All the respondents were familiar with rabies but were not well-known for other zoonotic diseases. Chowdhury *et al.* (2018) reported that 47.83% of the livestock farmer knew that disease can be transmitted from animal to human but 52.17% had no idea about zoonotic disease. Name of the foot and mouth disease (FMD), anthrax, rabies, mastitis, tetanus, brucellosis, bovine tuberculosis was mentioned by100%, 65.22%, 60.87%, 60.87%, 73.91%, 21.74%, 13.04% of the livestock farmer respectively. Transmission mode of FMD, anthrax, tetanus, rabies was known to 34.78%, 56.52%, 73.91%, 95.65% of the livestock farmers respectively. About 35% of farmers knew that disease can be transmitted by consumption of raw milk and meat, whereas 65.22% had no idea about that. Around 47.83% of the livestock farmer used prescribed medicine by the veterinarian to treat the disease of their farm animal but 34.7% of the farmer went to local pharmacists for the treatment of the disease of their farm animal. Most of the farmers (78.26%) had the idea about the availability of vaccination against some zoonotic disease. When animals became sick, 63.63% of the respondent took necessary steps as early as possible but 36.36% delayed for a few days. Around 47.83% of farmers introduced new animals in the herd directly, only 8.69% conducted health check-ups of the animal before introduction in the herd.

Narhari, (2018) found that it was known to only 21.25% of the livestock farmer that disease can be transmitted from animal to human partially, others (78.75%) showed very poor knowledge level. Regarding the route of zoonotic disease transmission, only 6.87% of the dairy farmers were well known to the fact that contaminated milk, meat, and water may causes diseases, whereas 62.50% had partial and 30.63% had poor knowledge about it. Most of the dairy farmers (98.75%) had very poor knowledge regarding the transmission of disease through direct or indirect contact with animals. The majority of the livestock farmer had poor knowledge regarding disease transmission through inhalation (100%) and the wound (99.37%). Munisamy *et al.* (2017) reported that awareness regarding zoonotic disease was observed among 77% of the dairy farmer. 77.3%, 62%, 18.1%, 16.8%, 11.6%, of the farmer knew about rabies, FMD, tuberculosis, anthrax, and brucellosis. The transmission route of zoonotic disease was known to 56% of the dairy farmer and the ingestion route was mentioned by the majority of the farmer (55%).

## **2.5 Knowledge about the specific disease**

**Rabies**: It was revealed that about 48% of the livestock farmer knew that the affected area of dog bites should be clean with soap, but 29.6% were unaware about that, whereas 1.2% recommended the application of chili powder on the wound (Rajkumar *et al.,* 2016).Hundal *et al.*(2016) reported that rabies is a well-known zoonotic disease among livestock farmers of Punjab. About 98.4% of farmers knew that rabies can be transmitted through the bite of a rabid dog, but another transmission mode (saliva of the rabid dog, contact with rabid dogs) was less known to them.

Around 69.2% of livestock farmers knew that after a dog bite the area should be clean with soap and the application of chili powder was suggested by 30.8%. 96.8% of farmers knew that vaccines should be given after biting a rabid dog. Narhari, (2018) observed that all of the livestock farmers (100%) knew that bite of a rabid dog can cause rabies while 62.50% knew that contact with the saliva of a rabid dog can also cause rabies. Only 46.25% and 10.63% of the farmer knew symptoms of rabies in animals and humans respectively.

**Brucellosis:**  Brucellosis was known to only 4.8% of the respondent, and 0.8% of the farmer knew that vaccination is available against brucellosis. Brucellosis is a common zoonotic disease and may cause abortion in the animal during the third trimester of pregnancy **(**Rajkumar *et al.,* 2016). Another study (Narhari, 2018) reported that 93.75% of the livestock farmer knew that brucellosis causes abortion in an animal in the third trimester but only 43.12% of the farmer knew that brucellosis can also cause retained placenta. Most of the farmers had poor knowledge regarding the transmission mode of brucellosis.

**Bovine tuberculosis:** Narhari, (2018) reported that 96.25%, 94.37%, 86.87% of the livestock farmer had poor knowledge about transmission of bovine TB through drinking raw milk, droplet inhalation from the pulmonary lesion, contact with contaminated material respectively, and 100% of them had poor knowledge about symptom of TB in the animal.

**FMD**: Chowdhury *et al.* (2018) reported that signs and symptoms of FMD were known to 95.65% of the farmer but only 50% knew that transmission may occur through direct contact with a diseased animal. Vaccination of the animal against FMD was done by 82.60% of the livestock farmer. Around 43.2% of the livestock farmer gave a history of FMD outbreak and 24.07% suffered from hand and foot lesions after handling affected animals (Rajkumar *et al.,*2016) revealed that. Narhari, (2018) found that 100% of the livestock farmer had poor knowledge about the transmission of FMD by direct and indirect contact with the diseased animal. But all of them were well known to the symptom of FMD like vesicles in the mouth, feet, and teat in the animal.

**Tetanus:** Chowdhury *et al.* (2018) found that the majority (73.91%) of the livestock farmer knew that tetanus is a zoonotic disease but only 39.13% knew the sign, symptom of tetanus. About one-fourth (26.09%) of farmers knew the transmission mode of tetanus.17% were aware of vaccination is available against tetanus. Transmission knowledge of tetanus through wound infection was good, partial, and poor in 38.75%, 56.25%, and 5% of the dairy farmer respectively. But most of them had poor knowledge about the symptom of tetanus (Narhari, 2018).

**Anthrax:** Study reported that 38.46% of the livestock farmer knew that anthrax can be transmitted by direct contact with the diseased animal. About 39.13% of farmers knew the significant symptom, and only 17.39% knew about vaccination against anthrax **(**Chowdhury *et al.,* 2018). Narhari, (2018) reported that 100% of the farmers were unaware of the transmission mode of anthrax and only 8.13% knew that death may occur in animals due to bleeding from nasal orifices.

## **2.6 Conclusion**

Through these studies, it can be concluded that most of the livestock farmers had inadequate knowledge and awareness regarding transmissions of zoonotic disease. Zoonotic diseases negatively influence the livelihood of livestock farmers by affecting their health and financial solvency. However, these diseases can be prevented by providing adequate knowledge about zoonotic disease transmission to the livestock farmers. After going through an extensive literature review, key factors regarding the zoonotic disease occurrence and transmission were identified and a questionnaire was developed accordingly for this study.

# **Materials and Methods**

## 3.1 Type and period of study

A cross-sectional study was conducted over one year, starting from January 2019 to December 2019. It started with a literature review, then a protocol presentation. After developing the questionnaire by August 2019, a pretest was performed in September 2019. After necessary modification and correction, data collection was started from 1st week of October 2019. After collecting data, compilation, processing, analysis, and report writing was done by mid of December 2019.

## Description of the study area

Different livestock farms in Chattogram district. Chattogram district is located in the south-east region of Bangladesh. It is a part of the Chattogram Division (Figure 1). This district is bounded by Bandarban, Rangamati, and Khagrachhari district on the east, Noakhali district and the Bay of Bengal on the west, Feni district and Tripura (Indian state) on the north, Cox's Bazar district on the south. The annual average temperature of this district varies from a maximum of 32.5$℃$ to a minimum of 13.5℃. The average rainfall is 3378 mm (Table 1).

**Table 1: Demographic profile of the study area**

|  |  |
| --- | --- |
| **Particulars** | **Values**  |
| Total Geographic Area  | 5282.92 Sq. Km. |
| Upazila | 15 |
| Thana | 31 |
| Population (In Lac)  | 76,16,352 |
| Male  | 38,38,854 |
| Female  | 37,77,498 |
| Density / Sq. KM. | 1442  |
| Literacy Rate | 58.90% |
| Literacy (Male)  | 61.10% |
| Literacy (Female) | 56.70 %  |

## 3.3 Study Population

The study participants were livestock farmers of the Chattogram district

## **3.4 Selection Criteria**

### **3.4.1 Inclusion Criteria**

Livestock farmers from a different area of Chattogram district who had at least 3 farm animals plus1-year work experience and participated voluntarily were selected for this study.

### **3.4.2 Exclusion Criteria**

Livestock farmers who are suffering from visual, hearing, or cognitive impairment and were not willing to participate were excluded from this study.

## **3.5 Sample size and sampling plan**

### **3.5.1 Sample Size**

A total of 100 livestock farmers were selected randomly from a different area of the Chattogram district.

### **3.5.2 Sampling plan**

A convenient sampling technique was followed for this study. The selection of the study area, blocks, and the ultimate respondents’ farmers were included in the sampling plan. The sampling process has been described in the following paragraphs.

* + 1. **Selection of division**

Chattogram Division was selected purposively to evaluate the knowledge and awareness level of livestock farmers regarding zoonotic diseases, as no other study has been done here yet.

### **3.5.4 Selection of district**

Chattogram district was selected because commercial livestock farming is more developed in this region due to the great demand for milk, meat, and other dairy product.

### **3.5.5 Selection of thana**

A large number of livestock farms are in Karnaphuli (a police station area under Patiya, has been upgraded to an upazila), Anowara, Patiya, Hathazari, Fatikchori, Banshkhali, Chandonaish, Chattogram Metropolitan area, etc. So, these places were selected randomly.

### **3.5.6 Selection of villages/Union**

Shikolbaha, Shahmirpur, Juldha from Karnaphuli thana, Chatary, Bairag from Anowara, Shadhonpur. Pukuria from Banshkhali, Kusumpura, Monsha from Patiya, Borkal from Chandonaish, Madar shah, Dholoi from Hathazari, Doulatpur, Bhujpur from Fatikchori were selected randomly.

### **3.5.7 Selection of respondents**

A total of 100 livestock farmers were selected from different villages Chattogram district.

## **3.7 Research Instruments**

The following research instruments were used for data collection.

### **3.7.1 Information to participants**

A questionnaire form was designed considering the objectives of the study. The importance of data collection for this study was informed to the respondents before participating in the face-to-face interview willingly.



**Figure 1: Chattogram division map showing the study area**

**3.7.2 Questionnaire**

The questionnaire used in the current study includes socio-demographic information of the respondents, information about risk factors associated with farm activities and farm management, and knowledge and awareness of the zoonotic disease among livestock farmers in Chattogram.

## **3.8 Data Collection Technique**

Data were collected through face-to-face interviews using a structured questionnaire.

## **3.9 Pre-Testing of Questionnaire**

Before going to the process of data collection, pretesting was carried out on 10 farmers after matching the selection criteria to finalize the procedure and to evaluate the effectiveness of the research instrument. During pretesting researcher asked participants any specific words or sentences they failed to understand as well as an unacceptable or offensive word or expression. Participants were also asked about language difficulties or any alternatives that fit better to their language. Then modifications were made as necessary and the research instrument was finalized.

## **3.10 Data Management and Analysis**

The data entry was started immediately after the completion of data collection. The collected data were checked, verified, and coding, post coding, and then import into the computer. The analysis was carried out by using descriptive statistics with the help of SPSS (Statistical package for social science) version 23 windows software program.

## **3.11 Ethical Consideration**

The study was done through the collection of data using a questionnaire and observation checklist. No intervention or any other invasive procedure was undertaken. Before initiation of the study, each respondent/participant was informed about the research, and verbal or written consent was taken. Participation in the study was voluntary. Before the selection of participants, each potential participant was provided with a consent form in Bengali. The contents of the form were designed to explain the aims and nature of the study and the procedure they were needed to undergo. They were informed that they have the right to refuse to respond to any or the entire interview questions and they also have the right to withdraw from an on-going interview. Each potential participant was selected after they provide consent by giving their signature or thumb impression. The study was not entailed by gender sensitivity, ethnic sensitivity, cultural and political sensitivity. Subjects were informed about the nature and purpose and confidentiality of data handling. A complete assurance was given to them that all information provided by them would be kept confidential and their names or anything which can identify them would be published or exposed anywhere. Their participation and contribution were acknowledged with due respect. After completion of these procedures, the questionnaires were administered with their consent.

# **4.0Results**

This cross-sectional study was carried out to assess the status of knowledge, awareness, and risk of zoonotic disease among livestock farmers in Chattogram. A total of 100 livestock farmers were interviewed with a structured pretested questionnaire. The collected data were analyzed with the help of SPSS version 23. This chapter presents the findings of those data by tables and graphs in the following order:

 4.1: Socio-demographic factors

4.2: Risk factors associated with farm activities and farm management

4.3: Knowledge and awareness level of farmer toward zoonotic disease

# **4.1: Socio-demographic characterization of respondents**

## **4.1.1 Geographic location**

Figure2 shows most (35%) of the respondents were from Karnaphuli while 20% of the respondents were from Hathazari. Respondents from Anowara, Metropolitan area, Patiya, Bashkhali were 12, 11, 8, and 6% respectively. Around 3 and 5% of respondents were from Chandonaish and Fatikchari, respectively.

Figure 2: Respondent’s distribution according to geographic location

## **4.1.2Gender, age group, religion**

The distribution of respondents by their age, gender group, and religion are given in Table 2. It has been observed that 96 % of respondents were male while only 6% were female. The age of the respondents was in between 22 years and 62 years and the mean age was 40.05 ±9.82 years. Most (34%) of the respondents were between 30 to 40 years ago. Only 2 out of 100 respondents were aged above 60 years comprising 2% of the target population. According to this study data, most (97%) of the respondents are Muslim while 3 % are Hindu.

**Table 2: Distribution of respondents by gender and age groups**

|  |  |  |
| --- | --- | --- |
|  | **Frequency** | **Percentage** |
| **Gender** |  |  |
| Male | 94 | 94 |
| Female | 6 | 6 |
|  |  |  |
| **Age (year)\*** |  |  |
| 20-30 | 16 | 16 |
| 30-40 | 34 | 34 |
| 40-50 | 33 | 33 |
| 50-60 | 15 | 15 |
| >60 | 2 | 2 |
| **Religion** |  |  |
| Islam | 97 | 97 |
| Hindu | 3 | 3 |

**\* Minimum age= 22 years; maxi mum age= 66 years; Mean age= 40.05±9.82 years**

## **4.1.3Educational level**

Table 3 summarizes the distribution of the respondents according to their educational level. The highest level (45%) of the respondents completed primary level education while 25% completed secondary school certificate. Only 3 % of the respondents received education up to graduation or above whereas 17% were illiterate.

**Table 3:** **Educational level of the respondents**

|  |  |  |
| --- | --- | --- |
| **The educational level of respondents** | **Frequency** | **Percentage** |
| Illiterate | 17 | 17 |
| Primary completed | 45 | 45 |
| SSC | 25 | 25 |
| HSC | 10 | 10 |
| Graduation and above | 3 | 3 |

## **4.1.4Occupation**

Farming was the main business among 85 out of 100 farmers comprising 85 % of the total respondents. Around 13% of respondents run the farm as their side business while 2% raised cattle for family nutrition (Figure 3).

Figure 3: Distribution of respondents by occupation

## **4.1.5Income**

Table 4 indicates that the majority (55%) of the respondent’s monthly family income was 50000 Tk. Around 38% of respondents belonged to the medium (50000 to 100000 Tk.) income group. The percentage of the respondent under the high (>100000Tk.) income group is 7%.

**Table 4: Monthly family income (n=100) of the respondents**

|  |  |  |
| --- | --- | --- |
| **Monthly family income (Tk)\*** | **Frequency** | **Percentage** |
| Low (Up to 50000) | 55 | 55 |
| Medium (50000- 100000) | 38 | 38 |
| High (>100000) | 7 | 7 |

\*Minimum income= 35000 Tk; Maximum income=1,30,000 Tk.

Mean income = 48,242.86 ± 12,698.99 Tk

## **4.1.6Marital status and family size**

The marital status and family size of the respondents of this study are presented in Table 5. The study observed that 66% of the respondents were married and 34% were unmarried. There were 22% of respondents who had a family with less than 5 members, 67% of families had 5 to 8 members and 11% of families had more than 8 family members.

**Table 5: Frequency of respondents according to their marital status and family size**

|  |  |  |
| --- | --- | --- |
|  | **Frequency** | **Percentage** |
| **Marital status** |  |  |
| Married | 66 | 66 |
| Unmarried  | 34 | 34 |
| **Family size(members)** |  |  |
| Small (<5) | 22 | 22 |
| Medium (5-8) | 67 | 67 |
| Large (> 8) | 11 | 11 |

# **4.2 Risk factors associated with the housing of animals, farm management, and activities**

## **4.2.1 Housing of animals**

The distributions of respondents based on the housing condition of animals are summarized in Table 6. Most (62%) of the dairy farmers owned medium-size herd followed by 20% of farmers with large herd sizes. The rest of the farmers (18%) belonged to small herd size. There were 11% of farmers who had poultry farms associated with a dairy farm. The percentage of the farmers who provided adequate space for the animal movement was 85%.

**Table 6: Different housing characteristics of the study farm**

|  |  |  |
| --- | --- | --- |
|  | **Frequency** | **Percentage** |
| **Herd size** |  |  |
| Small (2-6 animals) | 18 | 18 |
| Medium (7-15 animals) | 62 | 62 |
| Large (16 or more animals) | 20 | 20 |
| **Associated poultry farm**  |  |  |
| Yes | 11 | 11 |
| No | 89 | 89 |
| **Space for animal movement** |  |  |
| Adequate | 85 | 85 |
| Not adequate | 15 | 15 |

## **4.2.2 Various farm activities and farm management practices**

Table 7 summarizes the distribution of respondents according to the different risk factors associated with the various farm activities and management practices. The resident of the majority (77%) of the respondents was located distant from the animal shed while 23% of sheds were located adjacent to the residence. It was found that 18 out of 100 farmers sleep in the animal shed comprising 18% of the total respondents. Only 5% of farmers took preventive measures against mosquitoes or fly. None of the farmers imposed any restriction on the visitor's or children's access to the farm. Child labor was observed in 16% of the farms.

All the farmers washed their hands after handling the animals. However, only 6% of farmers washed their hands before handling the animal. There was no foot bath observed in front of the entry gate of the farm. The practice of eating or drinking while handling animals was observed in 2% of the farm.

**Table7: Potential risk factors associated with various farm activities and farm management practices**

|  |  |
| --- | --- |
| **Risk factors** | **Exposure** |
| **Frequency (n =100)** | **Percentage** |
| **Location of shed** |
| Distant from the resident | 77 | 77% |
| Adjacent to the resident | 23 | 23% |
| **Sleep in an animal shed** |
| Yes | 18 | 18% |
| No | 82 | 82% |
| **Preventive measures against fly/mosquito** |
| Yes | 5 | 5% |
| No | 95 | 95% |
| **Visitor restriction** |
| Yes | 0 | 0% |
| No | 100 | 100% |
| **Restriction of children access** |
| Yes | 0 | 0% |
| No | 100 | 100% |
| **Child labor** |
| Yes | 16 | 16% |
| No | 84 | 84% |
| **hand was before handling of animals** |
| Yes | 6 | 6% |
| No | 96 | 96% |
| **Hand was after animal handling** | 100 | 100% |
| **Footbath** | 0 | 0% |
| **Eating/drinking during handling of animals** |
| Yes | 2 | 2% |
| No | 98 | 98% |
| **Drainage system of farm** |
| Regular sewage | 17 | 17% |
| Dumping site | 51 | 51% |
| Open water body | 32 | 32% |
| **Manure management** |
| Biogas | 17 | 17% |
| Fuel | 51 | 51% |
| Fertilizer | 32 | 32% |
| **Frequency of shed cleaning** |
| Monthly | 22 | 22% |
| Quarterly | 78 | 78% |
| **Use of disinfectant** |
| Phenyl | 16 | 16 |
| Bleaching powder | 28 | 28 |
| Potash water and lime | 10 | 10 |
| None | 46 | 46 |
| **Introduction of new animals to herds** |
| Without health check-up | 97 | 97% |
| After health check-up | 3 | 3% |
| **Disposal of sick/dead animals** |
| Throw in the canal | 26 | 26% |
| Deep burial | 74 | 74% |

Table 6 indicated that the majority (97%) of the farmers introduced new animals to the herd without any health checkups.  This study observed that 74% of the farm followed the deep burial method to dispose of the dead/sick animals, while the rest of the farmers just threw them in the canal. To drain the farm wastage, 17% of the farm used regular sewage systems whereas 51% of farms used a dumping site. The percentage of farmers that threw their waste in an open water body was 32.

The manure was used as fuel and fertilizer by 51 and 32% of the farmer, respectively. Only 17% of farmers produced biogas with manure. Most (78%) of the farmers cleaned their sheds quarterly while 22% of farmers did it monthly. Around 46% of farmers did not use any disinfectant to clean the shed. However, 16, 28, and 10% of farmers cleaned the shed with phenyl, bleaching powder, potash with lime, respectively.

## **4.2.3 Practices during handling and disposing of sick or dead animals**

The distribution of the respondent by potential risk factors related to the various practices during handling and disposing of sick or dead animals are presented in Table 8. None of the farmers used personal protective measures (PPE) while handling sick or dead animals. A majority (95%) of the farmers properly disposed of the feces from diarrhoeic animals. Around 10 and 17% of the farmers did not use gloves while giving the intra-uterine medicine or assisting the cow during calving. Only 2 % of farmers did not use gloves during disposing of the aborted fetus or infected placenta. The percentage of retained placenta cases was 14%. None of the farmers slaughtered or skinned the infected animals on the farm.

**Table 8:** **Exposure of the respondents to potential** **risk factors associated with various practices during handling and disposing of sick or dead animals**

|  |  |
| --- | --- |
| **Experiences** | **Percentage** |
| Use of personal protective measures (PPE) | 0% |
| Disposal of feces from a diarrhoeic animal | 95% |
| Giving intra-uterine medicine without gloves | 10% |
| Assisting cow during calving without gloves | 17% |
| Disposal of an aborted fetus with the naked hand | 2% |
| Incidence of retained placenta | 14% |
| Disposal of infected placenta without gloves | 2% |
| Slaughtering or skinning the infected animal | 0% |

## **4.2.4 Animal feed and drinking water**

All the farms feed their animals grass and commercial feed. The animals were fed every 2-3 hours interval. Deep tube well water was the source of drinking water for all the farms (data not shown).

## **4.2.5 Maintenance of hygiene during milking, milk processing, and storage**

All the farmers washed their hands and cleaned the udder of cattle before milking (Table 9). None of the farmers used gloves during milking. All the farmers stored milk in a clean container.

**Table 9: Practice of hygiene maintenance during milking, milk processing, and storage**

|  |  |  |
| --- | --- | --- |
| **Practices** | **Frequency** | **Percentage** |
| Wash hands before milking | 100 | 100 |
| Wear Gloves during milking | 0 | 0 |
| Clean udder before milking | 100 | 100 |
| Store milk in a clean container | 100 | 100 |

## **4.2.6 Food Consumption Habit**

Pasteurization was not practiced in any of the farms under this study. None of the farmers consumed raw milk or meat. Around 28% of the framers made cheese or curd with milk and all of them boiled milk before making cheese or curd (Figure 4).

Figure 4: Food consumption habit of the respondents

## **4.2.7 Disease history**

Figure5 shows that 89 out of 100 farmers suffered from frequent health problems. comprising 89% of the total respondents. Most (30) of them suffered from frequent respiratory problems, 22 of them suffered from multiple health problems. Frequent respiratory disease was the problem for 15 farmers followed by frequent skin disease (13).

Figure 5: Health problems reported by the respondents

## **4.2.8 History of chronic disease**

Figure 5 shows that 78 out of 100 farmers were suffering from chronic diseases. Most (31) of them were suffering from multiple chronic diseases, 15 of them were suffering from hypertension, 13 from diabetes, 12 from heart diseases, and 7 from chronic kidney disease.

Figure 6: Distribution of the respondents according to chronic diseases

# **4.3 Knowledge and awareness level of farmers related to zoonotic disease**

In this study, the knowledge level of the respondents was assessed based on their response towards the set question related to zoonotic diseases and categorized into 3 levels like poor, partial, and Fully correct. A score of 2 was assigned for the fully correct response, the score of 1 was assigned for partial correct response and the score of 0 was assigned for the incorrect (poor) response.

## **4.3.1 Farmers knowledge regarding the possibility of transmission of zoonotic diseases**

Table 10 presented the distribution of framers based on their knowledge level related to the transmission route of zoonotic diseases. It was observed that the majority (78%) of the farmers did not know that disease can be transmitted from animal to human and vice versa. Only 22% of respondents partially knew that infected animals might cause disease in humans and vice versa. A majority (62%) of the respondent correctly pointed out that zoonotic diseases could be transmitted through the consumption of contaminated milk, meat, or water while 33% of respondents had no idea about this. Around 99% of respondents had no idea about the possible transmission of zoonotic disease through contact (direct/indirect) with infected animals or their wounds while the rest (1%) of them had partial knowledge. A small percentage (3%) of respondents fully aware of the transmission of zoonotic disease through the bite of animals or contact with infected animals’ saliva, while 63 and 34%of respondents showed poor and partial knowledge respectively. None of the respondents had any correct knowledge about the possible transmission of zoonotic diseases by inhalation, or the bite of arthropods.

**Table 10: Knowledge of farmers related to the possibility of transmission of zoonotic diseases**

|  |  |
| --- | --- |
|  | **Knowledge level1** |
|  | **Poor** | **Partial** | **Full** |
| **Knowledge related to possible transmission of zoonotic diseases**  |
| Animal to human | 78 (78) | 22 (22) | 0 (0) |
| Human to animals | 78 (78) | 22 (22) | 0 (0) |
| **Transmission route of zoonotic diseases** |  |  |  |
| Consumption of contaminated milk, meat, and water | 31(31) | 62(62) | 7 (7) |
| Direct or indirect contact with indirect animals or wound | 99 (99) | 1 (1) | 0 (0) |
| Bite of infected animals | 63 (63) | 34 (34) | 3 (3) |
| Inhalation  | 100 (0) | 0 (0) | 0 (0) |
| Bite of anthropods | 100 (0) | 0 (0) | 0 (0) |

**The figure shown in parenthesis indicates the percentage**

**1 Poor = Farmer has no idea or gave completely wrong answers (score 0)**

**Partial = Respondents named correct and wrong zoonotic diseases or means of transmission (Score 1)**

**Fully correct = Respondents named at least one correct zoonotic disease or means of transmission (Score 2)**

## **4.3.2 Zoonotic disease mentioned by respondents**

Table 11 showed that 100% of farmers correctly mentioned FMD and rabies as a zoonotic disease while the same percentage of farmers did not know brucellosis as such. The majority (85%)of the farmers knew about anthrax while the rest (15%)of them did not hear about it.

**Table 11: Respondents familiarity with the zoonotic disease (n = 100)**

|  |  |  |
| --- | --- | --- |
| **Disease**  | **Frequency** | **Percentage** |
| **Anthrax**  | 85 | 85 |
| **Brucellosis** | 0 | 0 |
| **FMD** | 100 | 100 |
| **Rabies** | **100** | **100** |

## **4.3.3 Knowledge level of farmers regarding different zoonotic diseases**

The knowledge level of farmers about different zoonotic diseases is summarized in Table 12. None (100%) of the farmer did know that anthrax can be transmitted through inhalation, direct or indirect contact with infected animals. A majority (92%) of the farmers was not familiar with the sign and symptoms of Anthrax, while the rest (8%) of them partially knew that anthrax causes unclotted bleeding from natural orifices leading to death. The farmers (100%) did not know the extent of the fatality of this disease.

The farmers (100%) admitted that they had no idea about the transmission of brucellosis through air or consumption of raw milk. Only 1% of farmers partially or correctly knew that brucellosis can be transmitted through direct contact with the discharge from infected animals. Abortion in the last trimester, retention of placenta, and repeat breeding were correctly mentioned as clinical signs of brucellosis by 94, 43, and 5% of respondents, respectively. Around 47, 91, and 85% of farmers had no idea that brucellosis can cause retention of placenta, anestrus, and repeat breeding in animals respectively. The percentage of farmers who identified repeat breeding as a sign of brucellosis is 5%. The farmers (100%) did not know that brucellosis can cause orchitis or undulant fever in man. None of the farmers knew the brucellosis test in animals.

In the case of FMD, all the farmers correctly knew that FMD can be transmitted through direct contact with infected animals. However, they (100%) had no idea about the other transmission route like direct contact with discharge or consumption of raw milk from infected animals. All the farmers had full and correct knowledge about the sign and symptoms of FMD.

Regarding rabies, 100% of farmers had corrected knowledge about rabies caused by a bite of a rabid dog or cat. A considerable percentage of farmers partially (63%) or correctly (34%) knew about the transmission of rabies through direct contact with infected animals or their discharge. Only 46% of farmers had partially known that rabies causes profuse salivation, depression, and convulsion in animals while the rest (54%) of them did not know. Besides, 87% of farmers did not about the sign (salivation, excitement, dysphasia, hydrophobia, and convulsion) of rabies in humans while 2% of farmers had clear knowledge about that.

**Table 12: Knowledge level of farmers regarding different zoonotic diseases (n**=100)

|  |  |  |  |
| --- | --- | --- | --- |
| **Disease-specific variables** | **Poor** | **Partial** | **Full** |
| **Anthrax** | **Knowledge of transmission** |  |  |  |
| Inhalation /Air | 100 (100) | - | - |
| Direct contact with infected animals | 100 (100) | - | - |
| Direct contact with infected animals discharge | 100 (100) | - | - |
| **Familiar with sign and symptoms** |  |  |  |
| Sudden death, collapse, and convulsion before death, unclotted bleeding from natural orifices | 92 (92) | 8(8) |  |
| **Knowledge about the fatality of the disease** |  |  |  |
| Highly fatal disease in dairy animals | 100 (100) | - | - |
| Highly fatal disease in human beings | 100 (100) | - | - |
| **Brucellosis** | **Knowledge of transmission** |  |  |  |
| Inhalation | 100(100) | - | - |
| Consumption of raw milk  | 100(100) | - | - |
| Direct contact with discharge, urine,aborted fetus, placenta, and body fluids | 98 (98) | 1(1) | 1(1) |
| **Familiar with sign and symptoms** |  |  |  |
| **Animal** |
| Abortion in the last trimester  | - | 6(6) | 94 (94) |
| Retention of placenta  | 47(47) | 10(10) | 43(43) |
| Anestrus  | 91(91) | 9(9) | - |
| Repeat breeding  | 85(85) | 10(10) | 5(5) |
| **Man** |
| Orchitis  | 100(100) | - | - |
| Undulant fever  | 100(100) | - | - |
| **Brucellosis test of animals** |  |  |  |
| Twice a year  | 100(100) | - | - |
| **FMD** | **Knowledge of transmission** |  |  |  |
| Direct contact with diseased animals,  | - | - | 100 (100) |
| Direct contact with discharge, abraded skin, or wounds of infected animals | 100(100) | - | - |
| Consumption of raw milk of infected animal | 100(100) | - | - |
| **Familiar with sign and symptoms** |  |  |  |
| Vesicles in mouth, teat, and feet  | - | - | 100(100) |
| **Rabies** | **Knowledge of transmission** |  |  |  |
| Bite of rabid dog or cat | - | - | 100(100) |
| Direct contact discharge or wound of  rabid animal | 3(3) | 63(63) | 34(34) |
| **Familiar with sign and symptoms** |  |  |  |
| Profuse salivation, depression, and convulsions in infected animals | 54(54) | 46(46) | - |
| Salvation, excitement, dysphagia, hydrophobia, and convulsions | 87(87) | 11(11) | 2(2) |

Note: The figure shown in parenthesis indicates the percentage

## **4.3.4 Awareness of farmers towards zoonotic disease**

Table 13 shows that only 18% of farmers used to isolate their sick animals before placing them on the farm while 82% of farmers directly introduced new animals in the herd. All the farmers provided FMD vaccine to their animals and showed full perception about this vaccine while the reverse was the case for brucella vaccination. The percentage of farmers who have full knowledge and provided vaccination against rabies and anthrax was 46 and 5% respectively.

**Table 13: Farmers awareness towards zoonotic diseases**

|  |  |  |
| --- | --- | --- |
|  | **Frequency (n=100)** | **Percentage**  |
| **Vaccination of animals** |
| FMD | 100 | 100 |
| Rabies | 46 | 46 |
| Anthrax | 5 | 5 |
| Brucellosis | 0 | 0 |
| **Introduction of new animals on the farm** |
| Direct | 12 | 12 |
| Isolation | 82 | 82 |

## **4.3.5Training received by farmers**

Figure7 shows that out of 100 respondents had and 12 received training on farm management comprising 12% of the total respondents. The number of farmers who received training on biosecurity and first aid was 7 and 15 respectively.

Figure 7: Distribution of the respondents by training received

# **5.0Discussion**

## **5.1 Socio-demographic characterization of respondents**

In this study, it was observed that most (96%) of the respondents were male which implies that female participation in farming is low in this area. This finding is consistent with a similar study done in Nigeria (Oduwaiye *et al.,* 2017).The average age of the respondents was 40.05 years while a majority of the respondents fall under the age range of 30-40 years (34%) and 40-50 years (33%). This finding indicates that most of the respondents in this study were young and could be considered as active age group suggested by FAO (1997). According to FAO (1997), the people whose age group ranges from 29 to 59 years belong to the economically active population category. This study revealed that although 85% of respondents adopted farming as the main business while the monthly income of the most (55%) of respondents was low (up to 50000 tk). The majority (45%) of the respondents completed primary education while 17% were illiterate which indicates that the literacy level of farmers under this study was low. This may be a contributing factor toward the knowledge level of the farmer about the zoonotic disease of this area.

## **5.2 Risk factors associated with farm activities and farm management**

It was found that most (62%) of the farmers had a medium-sized herd consisting of 7 to 15 animals while 20% of the farms were rearing 16 or more animals. In contrast, a similar study (Chowdhury *et al.,* 2018) reported majority (69.57%) of the farmer had 2-6 animals in the herd.

This study observed that a majority (85%) of the farmers provided adequate space in the farm for easy movement of the animal. Besides most (89%) of the farms under this study was mainly dairy farm and had no poultry farm associated also with a dairy farm. These practices can minimize the inter-species or intra-species disease spread within the farm.

A significant percentage (77%) of farmers resident was located distant from the animal shed. Interestingly, it was found that 18% of farmers used to sleep in their farms but among them, only 5% of farmers took preventive measures against mosquito or fly. The entry to the farm by unwanted visitors or children was not restricted in any of the farms. Besides,16% of respondents allowed their children to participate in farm work. The presence of children on the farm and their involvement in animal management and handling can be important risk factors of zoonoses due to their vulnerability toward zoonotic diseases (Roess *et al.,* 2013; Hundal *et al.,* 2016a,2016b; Zambrano *et al.,* 2014).

Current study found that around 97% of farmers added new animals to the existing herd without prior health check-ups. Besides, although most (74%) of the farmers buried sick or dead animals into the ground, 26% of farmers threw them in canals. Although all the farmers washed hands after handling, only 6% of them washed hands before handling the cattle. There was no footbath present in any of the targeted farms. While studying the hygiene practice during milking, milk processing, and storage, it was revealed that 100% of farmers washed their hands and cleaned the udder of cattle before milking and none of them used gloves during milking. This finding is partially in agreement with Ozlua *et al.* (2020).Regarding waste management, the study shows that farmers (51%) disposed of the wastage either in an open dumping site or threw (32%) them in an open water body. Only 18% of farmers used regular sewage lines for disposing of the farm waste which is partially consistent with the findings of the previous study (Chowdhury *et al.,* 2018). Overall, this finding implies that despite following few sanitary and hygienic practices, the majority of the farmers still showed a lack of positive attitude in practicing strict hygienic and sanitary procedures while handling and disposing of the farm wastages which subsequently increase the occurrence of zoonotic disease.

In this study, the history of diseases which affect the farmers had been investigated. It was found that around 89% of farmers suffered from frequent health problems (like fever, digestive problems, etc.) among which 78% were chronic diseases. The percentage of respiratory and skin problems was 30 and 13%, respectively. This finding partially agrees with the previous study (Rajkumar *et al*., 2016). We cannot directly link the health problem of farmers with the zoonotic disease, but the possibility cannot be ruled out. Further study is warranted on this issue.

## **5.3 Knowledge and awareness level of farmers about zoonotic disease**

In this study knowledge and awareness about the zoonotic disease was an important consideration. Most of the farmers (78%) had no idea that zoonotic disease can be transmitted from animal to human and vice versa while only 22% showed partial knowledge about this issue and this is consistent with the previous study findings (Chowdhury *et al.,* 2018).According to this study, the majority of the farmer did not know the different transmission routes of zoonotic diseases like inhalation (100%), direct or indirect contact with infected animals or their discharges (99%), and anthropoid bite (100%). Surprisingly, 3 and 7% of farmers appropriately knew that infected animal's bites and contaminated milk, meat or water can transmit zoonotic diseases which are partially consistent with the previous study (Hundal *et al*., 2016; Babu *et al*., 2015). This can be partially explained by the low education level of the farmers of this study.

This study found that FMD and rabies are the most well-known zoonotic disease among all farmers while only 85% of farmers were aware of anthrax which is consistent with other study findings (Hundal *et al*., 2016; Chowdhury *et al.,* 2018). However, none of the farmers mentioned brucellosis as a zoonotic disease which does not agree with the previous study finding by Chowdhury *et al. (*2018) where 5 out of 23 farmers mentioned brucellosis as a zoonotic disease.

According to this study results, despite having mentioned anthrax as a zoonotic disease, all the farmers showed a lack of knowledge regarding the transmission and fatality rate of this disease. An only a small proportion (8%) of farmers roughly responded to the sign and symptoms of anthrax while the majority (92%) of them did not know about this. However, only 5 % of farmers maintained anthrax vaccination schedules for their animals. In contrast, Chowdhury *et al.,* (2018) revealed that 38.46% of the livestock farmer knew that anthrax can be transmitted by direct contact with the diseased animal, and only 17.39% knew about vaccination. Narhari (2018) reported that 100% of the farmers were unaware of the transmission mode of anthrax and only 8.13% knew that death may occur in the animal due to bleeding from nasal orifices.

The majority of the farmer had poor knowledge regarding the transmission mode of brucellosis. Except for direct contact. Only 1% of farmers partially or correctly identified direct contact (with discharge, urine, aborted fetus, placenta, and body fluids) as an important route of brucella transmission from animal to human. The farmers showed a certain extent of knowledge regarding signs and symptoms of brucellosis in animals. Around 94%of farmers knew abortion of last trimester caused by brucellosis. Besides, retention of placenta and anestrus also were well-known signs of brucellosis among 43 and 5% of farmers respectively. The farmers (100%) did not know that vaccination and testing of animals twice a year can prevent the occurrence of brucellosis. These findings agree with the previous study (Rajkumar *et al.,* (2016) where brucellosis was known to only 4.8%of the respondent and 0.8% of the farmer knew that vaccination is available against brucellosis (Hundal *et al.,* 2016).

This study revealed that all the farmers knew that FMD can be transmitted through direct contact with infected animals, but they had no idea about other possible transmission routes. Similarly, Narhari (2018) reported that 100% of the livestock farmer had poor knowledge about the transmission mode of FMD either by direct or indirect contact with the diseased animal, by or by drinking infected animal milk without boiling. The formation of vesicles in the mouth, teat, and feet was mentioned by all farmers as one of the most important signs of FMD which is consistent with the finding of Narhari (2018). Besides, all the farmers vaccinated their animals against FMD. However, Narhari(2018). Observed around 82.60% of FMD vaccine to their animals.

The farmers did not know that bite of rabid dogs and cats can spread rabies to healthy animals or humans. However, they partially (63%) or correctly (34%) mentioned other transmission routes of rabies-like direct contact with infected animals discharge or wound. In contrast, Hundal *et al*. (2016) reported that rabies is a well-known zoonotic disease among livestock farmers of Punjab where 98.4% of farmers know that rabies can be transmitted through bites of the rabid dog, but another transmission mode was less known to them. A majority (87%) of the farmers did not know the sign and symptoms of rabies in both humans and animals. Although a majority of the farmers lack knowledge about rabies vaccination in animals, a considerable proportion (46%) of them showed awareness about rabies vaccination schedule in humans. These overall findings suggested that the knowledge and awareness level of farmers related to the zoonotic disease is poor to partial which is consistent with previous findings (Hundal *et al.,* 2016).

This study revealed that only a small percentage of farmers obtained training on farm management (12%) and biosecurity (7%). Around 12% of farmers introduced new stock in the herd without isolation which indicates a breach of biosecurity management in the farm. This indicates that the targeted farmers lack proper training on biosecurity and farm management practices which should be considered as an important constraint in improving their knowledge and awareness level regarding zoonotic diseases. Besides, the socio-demographic condition of the farmers under this study may contribute to their poor understanding of zoonoses. Moreover, most of the targeted farms of this study had medium (7-16 animals) size herd with low to medium monthly income. Therefore, it is sometimes difficult to maintain all the hygienic practices and biosecurity measures to prevent the spread of zoonotic diseases by farmers with poor education and a low-income level.

# **6.0Conclusion**

In conclusion, this study found that all the farmers maintained hygienic procedures during milking and collecting milk. Half of the respondents used the dumping site for disposal and the rest threw waste in open water or regular sewage system. The farmers were reluctant about maintaining the proper hygienic procedures during handling and disposing of waste products of the animal. Most (77%) of the animal sheds were found adjacent to the residence and none of the farmers imposed any restriction to the visitor. Moreover, 97% of animals were added to the herd without a health check-up. Majority of the farmers partially or correctly identified FMD, Anthrax, and Rabies as zoonotic diseases whereas none of them know that brucellosis is also a zoonotic disease. Overall, these findings indicate that the hygienic and sanitation measures and biosecurity practices were not properly followed in the targeted farms under this study which subsequently may lead to the spread of zoonotic diseases among the farmers and animals. The poor educational background of the targeted farmers and inadequate training on biosecurity and farm management can influence their attitude towards the knowledge and awareness level related to the risk factors of zoonotic disease transmission and occurrence. This study will provide valuable information about knowledge, awareness, and risk of zoonotic disease among livestock farmers in the Chattogram district which might help to develop a strategy to enrich the dairy farm industry. Future in-depth studies may be done to explore the associations of other factors with knowledge, awareness, and risk of zoonotic disease among livestock farmers.

# **7.0 Recommendations**

Based on the study conclusion, the following recommendations were made for policy-making and further research:

1. Disbursing proper knowledge about zoonotic diseases to the farmers.
2. Initiatives may be taken to expand the facilities of training of the farmers.
3. Strict monitoring of waste disposal of the dairy farms.
4. Mitigation and elimination of causative factors that impose the risk of disease transmission from animal to man or vice versa.
5. Establishment of outreach veterinary health center at rural level.

# **8.0 Limitation**

All the farmers of the study area could not be included in the study due to time constraints and insufficient resources.

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**Appendix: A**

**Questionnaire on Knowledge, Awareness and risk of zoonotic disease among livestock farmer in Chittagong**

 Date-

1. **Demographic and socioeconomic information**
2. Identification no:
3. Name:
4. Age:
5. Address:

\*Put √ in the applicable box─

1. Sex: □Male □ Female
2. Religion:

□ Muslim □ Hindu □ Christian □ Buddhist

1. Marital status:

□ Married □ Unmarried

□divorced □ Widowed

1. Educational status:
2. How many people live in your house:
3. Do you have children below or at the age of five years old in your house:

□ Yes □ No

1. Farming as a source of income:

□main business □side business □family nutrition

1. Monthly income in BDT:

□low (5000-10000)

□Middle (11000-30000)

□ High (>30000)

1. **Assessment of risk factor associated with farm activities & farm management**

**A.HOUSING INFORMATION**

1. Number of animal in the herd-

Cow: Goat: Buffalo:

Sheep: Others:

1. . Associated poultry farm: □Yes □No
2. Ventilation system of your farm-
3. . Space for animal movement in shed: □adequate □inadequate

**B.ASSESSMENT OF BIOSECUIRITY**

1. Shed location:

□ Adjacent to the resident

□distant from the resident

1. Housing system:

□ Open (animal are kept loose except at the time of milking & treatment)

□Fixed (Animal are tied up with rope & rope obstructed with a pillar)

1. Do you sleep in animal shed? □yes □ no
2. Do you take preventive measures against fly/mosquito?

□ smoke/net/spray □none

1. Visitor access to animal-

□ restricted □not restricted

1. Children access to animal-

□ restricted □not restricted

1. Any children involved in your farm work? □yes □no
2. Do you have any experience of the following incident-

□disposal of feces from diarrheic animal

□giving intrauterine medication without gloves

□assisting cow during calving without gloves

□abortion of animal at the farm

□disposal of aborted fetus with naked hand

□incidence of retained placenta

□disposal of infected placenta without gloves

□apply cream of raw milk on skin cracks

□skinning/slaughtering infected animal

1. Introduction of new animal in herd-

□direct □after health check up

1. What do you do with the sick dead animal corpse?
2. Water source for human & animal □common □ different
3. Milk quality checking practice: □yes □no

**\*PERSONAL HYGIENE & USE OF PERSONAL PROTECTIVE EQUIPMENT**

1. Do you wash your hand before handling animal? □yes □no
2. Do you wash your hand after handling animal? □yes □no
3. Do you take foot bath before entering in animal farm? □yes □no
4. Do you eat or drink during handling animal? □yes □no
5. Any history of contact with scary hand-
6. Do you use personal protective equipment while handling animal? □yes □no
7. Which personal protective equipment do you use? □gloves □mask □boot

**C.WASTE MANAGEMENT OF FARM**

1. Waste drainage system of your farm-
2. What do you do with the manure of the farm?

**D.ANIMAL FEED & DRINKING WATER**

1. What is the source of your animal feed?
2. What is the ingredient of your animal feed?
3. How frequently you feed your animal?
4. What is the source of drinking water of your animal?
5. Do you clean the vessel for animal feed & drinking water regularly? □yes □no
6. How frequently you change the vessel for animal feed & drinking water?

**E.CLEANING OF ANIMAL SHED**

1. How many times do you clean your shed per month?
2. which disinfectant do you use-

□phenyl □bleaching powder

□potash water & lime □any other-

□none

**F.MAINTINENCE OF HYGIENE DURING MILKING, MILK PROCESSING & STORAGE**

1. Do you wash hand before milking? □yes □no
2. Do you use gloves during milking? □yes □no
3. Do you store milk in clean container? □yes □no
4. What kind of container do you use?-
5. Do you clean udder before milking? □yes □no

**G.FOOD CONSUMPTION HABIT**

1. Do you drink raw milk? □yes □no
2. Do you eat raw meat? □yes □ no
3. Do you pasteurize milk? □yes □no
4. What do you do with the milk?-
5. Do you make cheese or curd from milk? □yes □no
6. Do you boil milk before making cheese or curd?

**H.DISEASE HISTORY**

1. History of dog or fox bite of your farm animal-?□yes □no
2. Do you frequently suffer from any of the following health problem?

□respiratory disease □musculoskeletal disease □skin problem

□accident/injury □others-

1. Any history of chronic disease-

□diabetes □hypertension □heart disease □chronic kidney disease □others-

1. Did you suffer from any disease in the last 5 years?□yes □no
2. Any history of disease of your livestocks in last 5 years?□yes □no

**Assessment of knowledge and awareness of zoonotic disease among livestock farmer in chittagong**

1. Are you trained in any of the following activities-

□farm management □biosecurity □first aid knowledge

1. Do you know that some disease can transmit from animal to human being?□yes □no
2. Can you mention name of some disease that can transmit from animal to human-
3. Zoonotic disease list-

□Rabies □Brucellosis

□Bovine tuberculosis

□Anthrax □Bird flu □Swine fever

□Cysticercosis □Echinococcosis

1. Do you have knowledge about possible means of transmission of zoonotic disease-

a**. Food & water**

 □ contaminated milk □contaminated meat

□unpasteurized milk

 □raw milk □raw meat

 □contamination during production, processing & handling of food product of animal origin

□contaminated water & food

**b. Aerosol**

**c. skin- through a cut or scratch in skin**

**d. From animal & animal waste**

□contact with infected animal

 □improper disposal of waste from animal shed

□skinning of infected animal

 □slaughtering of diseased animal

 □disposal of infective material from the diseased animal

 □handling infected cow teats

**e. rabies transmission through-**

 □bite of rabid dog □saliva of rabid dog □contact with rabid dog

1. How do you treat your diseased animal?

□properly prescribed medicine by veterinarian

□local pharmacist

□herbal medicine

□any other method-

1. When do you start treatment of your diseased animal-□immediately □wait for few days
2. Do you isolate sick animal? □yes □no

If yes, explain the reason-

If no, explain the reason-

1. Do you properly vaccinate your animal? □yes □no

If yes, explain the reason-

If no, explain the reason-

□ignorance □lack of knowledge

 □lack of support from veterinarian □other cause-

1. Against which disease do you vaccinate your animal?-
2. Awareness about rabies-
3. Do you know that vaccination is necessary for human/animal after rabid dog bite? □yes □no
4. Do you know that annual vaccination of dog against rabies is necessary?
5. How do you manage rabid dog bite wound-

□wash with soap □apply chili powder □other method-

1. Awareness about Brucellosis-

a. Do you know that brucellosis can cause abortion in dairy animal? □yes □no

if yes, in which trimester?-

1. Health check up of the animal of your farm-□regularly □when needed
2. Do you hospitalize your sick animal-

If yes, explain reason-

If no, explain reason-

 □ignorance □lack of knowledge

 □transport problem

 □financial problem

 □lack of support from veterinarian □other cause-