

KNOWLEDGE, AWARENESS AND RISKS OF ZOO NOTIC DISEASES AMONG THE SMALLHOLDER LIVESTOCK FARMERS IN SUBURBAN AREAS OF SYLHET, BANGLADESH

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Abstract. Small scale livestock farming is playing a significant role in low and middle income countries of the world. It serves as an alternative source of income to the smallholder livestock farmers. On the other hand, it also enhances the risks of zoonotic diseases transmissions. This study aims to assess the knowledge, awareness and risk factors of zoonotic diseases among the smallholder livestock farmers of a targeted population. A semi structured questionnaire based interviews were conducted to assess the knowledge, awareness and risks of zoonotic diseases among the smallholder livestock farmers of the suburban areas in Sylhet region with a small data set of 23 farmers. Majority of the farmers participated in this study is small scale farmers with low income range and they hold a small herd size between 2-6 animals. About 34.78% of them have no educational background; consequently they had experienced more zoonoses than the others. Besides they were unaware of a number of risk factors associated with zoonotic diseases transmission. Foot and mouth disease was found as the most prevalent disease of that locality, though many of the respondents mentioned some other diseases like anthrax, tetanus, rabies, mastitis and brucellosis. Only 47.83% of these farmers were aware and do have knowledge regarding the causes and transmission process of different zoonoses. This study concluded that there are a number of potential risk factors associated with the occurrence and transmission of zoonotic diseases among the targeted population due to lack of knowledge and awareness.

Keywords: awareness, knowledge, risk factors, semi-structured questionnaire, smallholder livestock farmers, zoonotic diseases.

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Manuscript received: February 2018

1. Introduction

Zoonotic diseases are the diseases or infections that are naturally transmissible from vertebrate animals to humans and vice versa. These zoonotic diseases or “Zoonoses” may be bacterial, viral, or parasitic, or may involve unconventional agents (World Health Organization, 2015). Woolhouse denoted that, there are more than 700 human pathogens causing zoonotic infections that constitute 73% of the community acquired infections (Woolhouse and Gowtage-Sequeria, 2005). Several studies have showed that those pathogens are regarded as emerging and reemerging and are more

likely to be zoonotic than those that are not (Taylor *et al.*, 2001; Cleaveland *et al.*, 2001). Emerging zoonotic diseases are increasingly recognized as a global concern due to their potentiality of causing serious human health hazards and socio-economic impacts. In accordance to the Institute of Medicine (2009), zoonotic pathogens triggered more than 65% of emerging contagious disease events within the past six decades (National Research council, 2010; Narrod *et al.*, 2012). Animals play an essential role in transmitting various zoonotic infections in nature (World Bank, 2010; Mosalagae *et al.*, 2011). Zoonotic diseases can be transmitted from animals to human not only by direct interaction with animals but also through contamination during production, processing, and handling of animal products. Other risk factors are working with infected animals, skinning and slaughtering of diseased animals, improper disposal of animal waste, excreta and infectious materials of diseased animals (World Health Organization, 2006; Rajkumar *et al.*, 2016). The socio-cultural habits and socio-economic status have important effects in the development of these diseases. Developing and under developed countries are being comparatively more affected from these communicable and infectious diseases due to mismanagement of farms and lack of proper education/awareness, which is alarming (Cakmur *et al.*, 2015; Weber and Rutala, 1999; Seimenis *et al.*, 2012; Umar and Nura, 2008). In Bangladesh, livestock and poultry rearing are being considered as means of alleviating poverty and improving the livelihoods of landless farmers and smallholders. As a result a large number of landless and small farmers depend largely on livestock for their subsistence (Pica-Ciamarra *et al.*, 2011). There are more than 70% of the dairy farmers who are smallholders. These smallholder dairy farmers are involved in production of 70–80% of the country's total milk and other animal products (Uddin *et al.*, 2011). Therefore, a number of animal related problems that adversely affect human health and economy exist here like all other countries of the world, including 'Zoonoses' (Munisamy *et al.*, 2017; Daszak *et al.*, 2000). The sudden rise of livestock production in the last decade particularly in urban and suburban areas poses an increased threat of human diseases. Rural and semi-urban areas are at higher risk of zoonoses because of improper management and lack of awareness of the small scale livestock holders (Swai *et al.*, 2010). As the small scale livestock rearing for dairy products and family nutrition has been found more common among the people of suburban areas of Sylhet, so the people of this locality are certainly more exposed to a number of hazardous zoonotic diseases. Due to insufficient knowledge and training on farm management among the smallholder livestock farmers, both of the animals and farmers are at high health risk. Lack of knowledge among livestock owners is one of the important hurdles of zoonotic diseases transmission and prevention (Cakmur *et al.*, 2015; Munisamy *et al.*, 2017; Swai *et al.*, 2010; Umar and Nura, 2008). To prevent and reduce the rate of these infections successfully, individuals in contact with animals must be aware of the risks of these diseases. Proper knowledge and awareness of the risks of zoonotic diseases is a prerequisite for effective disease prevention. Currently, there is a little information regarding the perception, knowledge and risk of zoonotic diseases among the smallholder livestock farmers of northern east part of Bangladesh. This survey is undertaken to study the extent of knowledge, awareness, perception and risks of zoonotic diseases among small-holder livestock farmers in some of the suburban areas of Sylhet, Bangladesh. So, the objective of this study was to assess the level of risks, knowledge and awareness about the zoonotic diseases among the targeted population of the study area.

2. Method

Study area

This survey was conducted with randomly selected local smallholder livestock farmers of suburban area near Sylhet Agricultural University, Sylhet, Bangladesh.

Study population and Sample size determination

A simple random sampling method was employed to select the respondents. A total number of 40 small-scale dairy farmers from the nearby areas of Sylhet Agricultural University were primarily listed for the survey. After the primary interviews and survey of the listed farms, the data of 17 farmers were culled from the final survey result analysis due to improper responds. Finally, this study concluded with a small data set of 23 best suited farmer's information.

Study design and data collection

The respondents were interviewed with a semi-structured questionnaire containing both open and close ended questions on different aspects of farm management practices, maintenance of hygiene and about zoonotic diseases, i.e., awareness, knowledge, risks etc. The questionnaire was prepared and pre-tested during November- December, 2017 before the final data collection.

The questionnaire was organized in 4 sections with total 80 questions that covered socio-demographic information including respondent's location, gender, age and education level, information of farm management that concerned animal health and finally about their common perception, knowledge and awareness towards zoonotic diseases. In addition, the respondents were also asked questions regarding the use of traditional medicines for the treatment of zoonotic diseases in their area. The interviews were conducted in January, 2018. Apart from the authors, some of the interested students from Biotechnology and Genetic Engineering faculty of Sylhet Agricultural University also participated in this survey for data collection. The individuals who are directly involved in the maintenance of the farms and handle the animals were selected as the study respondents. All the data were collected according to the response of the responding farmers and after proper observations of the farms by the interviewers where needed.

Data analysis

After interview, every questionnaire was checked thoroughly. Questionnaires containing any obscure and misunderstood answers were excluded during the final data analysis. The final answers according to the questionnaire were entered into a computer spreadsheet, Microsoft Excel® (Microsoft Corporation, USA). Further descriptive data analysis like frequency, average and percentage were calculated by IBM-SPSS-22.

Ethical approval

No ethical approval was required for this study as it is a survey based study. However, the data were collected after obtaining consent from all of the participants involved in the study.

3. Result

Socio-demographic characterization of the respondents

Socio-demographic information of the smallholder livestock farmers were collected and recorded from the suburban areas of Sylhet, Bangladesh and given in the Table 1.

Table 1. Socio-demographic characteristics of the respondents

	Frequency (n=23)	Percentage (100%)
Gender		
Male	12	52%
Female	11	48%
Monthly income (in BDT)		
Low (5000-10,000)	10	43.48%
Middle (11,000-30,000)	8	34.78%
High (\geq 30,000)	5	21.74%
Farming as Source of income		
Main	8	34.78%
Side business	5	21.74%
Family nutrition	10	43.48%
Households with children \leq5 years old	12	52.17%

According to the present investigation most of the respondents are small scale farmers (43.48%) whose monthly income range was 5000-10000 Taka. Besides, most of these small scale farmers (43.48%) do farming as side business and for family nutrition. There were only 12 respondents among 23 comprising 52.17% of the total interviewee who have had children below or at the age of 5 years old. Based on this study it has been found that 52% of the farmers are male (Table 1) and 43.48% of the farmers ages between 36-45 years (Figure 1).

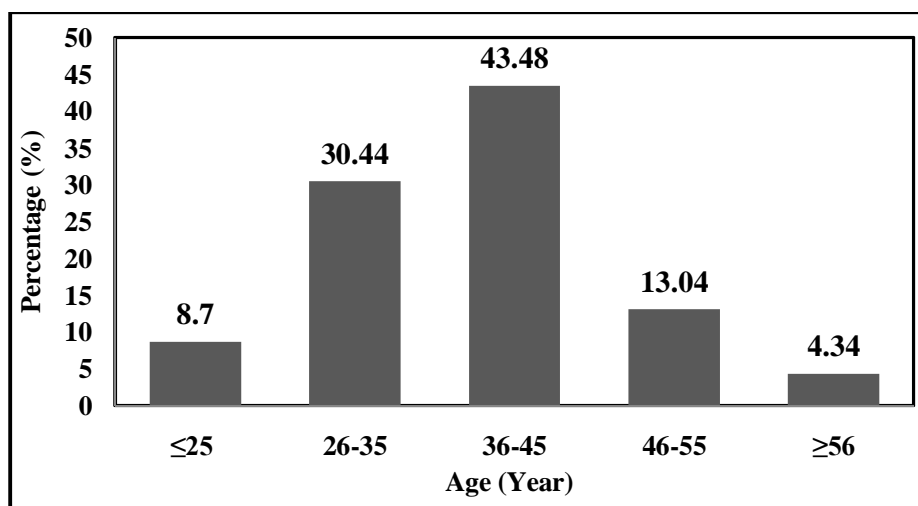


Figure 1. Distribution of the respondents according to age.

The educational qualification of the smallholder farmers of this study are presented in the Figure 2.

The survey revealed that, 34.78% of these farmers involved in small scale livestock rearing are illiterate, 26.09% of them have the experience of primary school and only 17.39% of them have attended secondary school, whereas 17.39% of them have higher level of education than this. Only 4.35% of the respondents attended university for graduation.

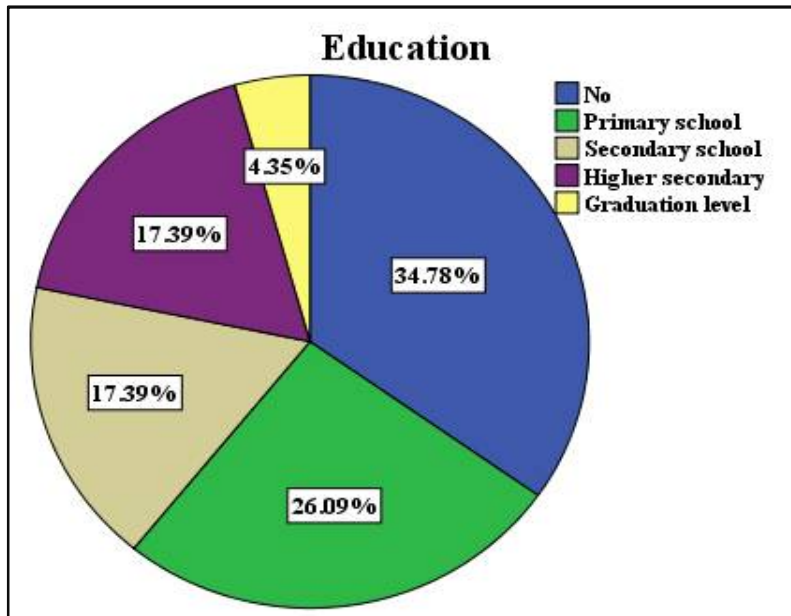


Figure 2. Distribution of the respondents according to their educational qualification.

It was observed that, 16 out of 23 of these smallholder dairy farmers own a small herd size of 2-6 which comprises 69.57% of the targeted population. Only 3 farmers own large herd size comprising 17-22 animals (Figure 3).

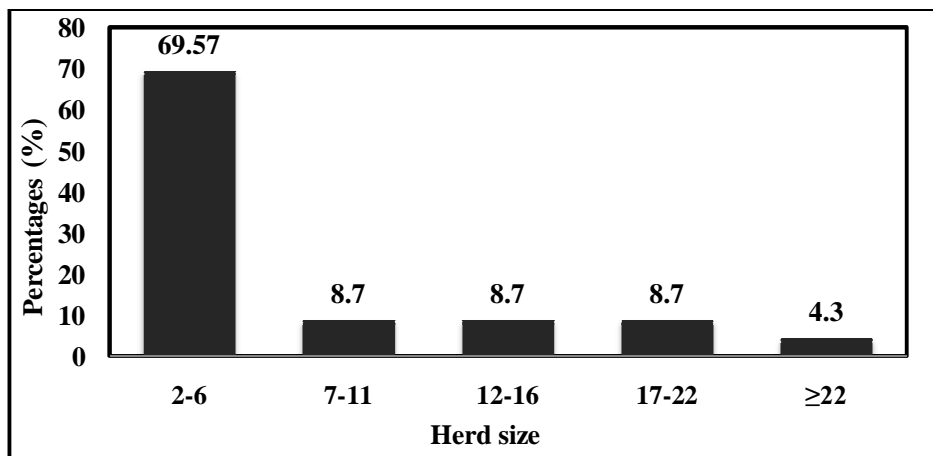


Figure 3. Distribution of the respondents according to their herd size

Risk factors associated with conventional management practices

This study revealed several the risk factors associated with the conventional animal management and hygiene practices. About 43 % of the farmers have their animal sheds located as adjacent to their residents, while 57% have their shade at distant from their own house. 100% of the respondents wash their hands with soap after interacting with the animals, which is a good practice of hygiene. Also 3 of the total respondents discharge the animal wastes into the open water body while majority of them, rest of them run their drainage system directly into the regular sewage line and only 4 of them use distant dumping site for draining out the animal waste from their farms. However, only 30.43% farmers admitted that they use disinfectants twice or thrice in a month whereas the majority 69.57% do not use any of these to clean their shed. Sharing the source of drinking water among human and animals, using the same vessels for livestock feed and water and an open access of children and visitor into the farm are some of the other potential risk factors of infectious disease transmission from animal which are presented in Table 2.

Table 2. Exposure of the respondents to potential risk factors associated with various farm activities and farm management practices

Risk factors	Exposure	
	Frequency (n=23)	Percentage
Shed location		
Adjust	10	43%
Distant	13	57%
Utilization of disinfectants for shed cleaning		
Phenyl	2	8.70%
Bleaching powder	3	13%
Potash water+ Lime	1+1	8.70%
None	16	69.57%
Hand wash after handling animal	23	100%
Vessel for animal feed and drinking water		
Common	15	65.22%
Different	8	34.78%
Water source for animal and human		
Common	21	91.30%
Different	2	8.70%
Drainage system of farm		
Open water body	3	13.04%
Regular sewage line	16	69.57%
Dumping site	4	17.39%
Children access to animals		
Restricted	8	34.78%
Not restricted	16	69.56%
Personnel/visitor access		
Restricted	11	47.83%

Not restricted	12	52.17%
Udder cleaning before milking		
Do	20	86.96%
Do not	3	13.04%
Udder cleaning with disinfectant		
Do	0	0%
Do not	23	100%
Milk quality checking practice		
Positive response	11	47.83%
Negative response	12	52.17%
Preventive measures against fly/mosquito		
Smoke/Net/Spray	20	86.96%
None	3	13.04%

Knowledge and perception towards zoonotic diseases

The present study revealed the different knowledge and experience level of the smallholder farmers about zoonotic diseases which is represented according to frequency and percentage in Table 3.

Table 3. Knowledge and perception of the respondents regarding zoonotic disease transmission and management

	Frequency (n=23)	Percentage
Perception of Zoonotic disease transmission from animal to human		
Known	11	47.83%
Not known	12	52.17%
Zoonotic diseases mentioned by the farmers		
FMD	23	100%
Anthrax	15	65.22%
Rabies	14	60.87%
Mastitis	14	60.87%
Tetanus	17	73.91%
Brucellosis	5	21.74%
Bovine tuberculosis	3	13.04%
Most prevalent enteric diseases		
Bloat	16	69.57%
Diarrhea	14	60.87%
Helminthes	9	39.13%
Worms	6	26.09%
Others	2	8.70%
Knowledge regarding transmission of the following diseases of animals		
FMD	8	34.78%

Anthrax	13	56.52%
Tetanus	17	73.91%
Rabies	22	95.65%
Knowledge of disease transmission through raw milk/meat/products		
Know	8	34.78%
Don't know	15	65.22%
Primary treatment of the diseased animals		
Natural/Herbal treatment	4	17.39%
Local pharmacist	8	34.7%
Proper prescribed medicine	11	47.83%
Perception of vaccination as preventive measure for all diseases		
Yes	18	78.26%
No	5	21.74%

52.17% of the total respondent did not know about zoonotic disease and disease transmission, while his 47.83% of them mentioned to be familiar with these diseases. FMD, Anthrax, Tetanus and Rabies were mostly familiar diseases to them. 34.78%, 56.52%, 73.91% and 95.65% of them have knowledge regarding transmission of FMD, Anthrax, Tetanus and Rabies respectively (Table 3). Also they have perception on the possible disease transmission routes of the above mentioned diseases to some extent. They mentioned about bloat (69.57%) and diarrhea (60.87%) as the most common enteric diseases of their livestock. 65.22% of the total respondents do not consider raw milk, meat or any animal product as route of disease transmission to human.

Zoonotic diseases reported by the respondents

All respondents knew that there are certain diseases in their area which might be zoonoses as per their conception. FMD, Anthrax, Tetanus and Rabies were reported as the top zoonotic diseases. An in depth knowledge of the respondents on the particular zoonotic diseases are given in Table 4.

Table 4. Knowledge of particular zoonotic diseases as reported by the respondents

Disease specific variables		Frequency	Percentage
FMD	Knowledge of transmission	(n=8)	
	Direct contact with infected animals	4	50%
	Fly	1	12.50%
	Inhalation/Air	3	37.50%
	Occurrence in farm	(n=23)	
	Yes	15	65.22%
	No	8	34.78%
	Familiar with the sign and symptoms	(n=23)	
	Yes	22	95.65%
	No	1	4.34%
	Perform vaccination against FMD	(n=23)	

	Yes	19	82.60%
	No	4	17.39%
	Perform treatment for FMD	(n=19)	
	Local	14	73.68%
	Prescribed	5	26.31%
Anthrax	Knowledge of transmission	(n=13)	
	Direct contact with infected animals	5	38.46%
	Saliva/body discharge	2	15.38%
	Inhalation	3	23.08%
	None	3	23.08%
	Familiar with the sign and symptoms	(n=13)	
	Yes	9	69.23%
	No	4	30.77%
	Perform vaccination	(n=23)	
	Yes	4	17.39%
	No	19	82.60%
Tetanus	Disease specific variables	Frequency	Percentage
	Knowledge of transmission	(n=23)	
	Know	6	26.09%
	Don't know	17	73.91%
	Familiar with the sign and symptoms		(n=23)
	Yes	9	39.13%
	No	14	60.87%
	Perform vaccination		(n=23)
	Yes	4	17.39%
	No	19	82.60%
	Relationship with castration, and dehorning	(n=23)	
	Know	6	26.09%
Don't know	17	73.91%	

The study indicated that the livestock farmers have moderate level of knowledge regarding the means or route of transmission, sign and symptoms of the diseases, performed treatment and vaccination of certain zoonotic diseases like FMD, Anthrax and Tetanus, but again their knowledge toward other diseases like rabies, brucellosis, bovine tuberculosis is low. Though 82.60% of the total target population performs vaccination against FMD, but 73.68% of them depend for local remedies rather than the prescribed medicine for this disease. Despite of 95.65% farmer's concept of the common signs and symptoms of FMD only 50% think direct physical contact is necessary for disease transmission between animal and human. Again, despite of 17 respondent's perception of Tetanus as a zoonotic disease, only 26.09% know about the way of Tetanus transmission, 39.13% are familiar with the sign and symptoms and about 17% do know about vaccination against this disease.

Awareness of the farmers towards zoonotic diseases

In the present study, the level of farmer's awareness to prevent various zoonotic diseases transmission was assessed by their hygiene practices and behavior towards animal health management given in Table 5.

Health management practices included, immediate response to sick animals (63.63%), regular health checkup in every 6 months by veterinarian (21.70%) and introduction of new stock into the herd (direct 47.83%, isolated 43.48% and after proper checkup only 8.69%). 78.26% of the farmers provide saline and 17.39% uses different herbal preparation such as extracts of Chinese rose or garlic pest besides saline as the primary treatment of the diarrheic animals. Although 78.26% of the respondents have the perception of vaccination to prevent diseases but only 65.22% are aware of the type of vaccines being used for animals. Here, about 95% individuals use antibiotics for their livestock with or without prescription. Also the higher rate of the farmers (52.17%) using human medicine for the animals in case of sickness remarked lack of awareness among them.

Table 5. Awareness of the smallholder livestock farmers toward zoonotic diseases

	Frequency (n=23)	Percentage
Response to sick animals		
Immediate	14	63.63%
Wait for few days	9	36.36%
Treat diarrheic animals with		
Saline	18	78.26%
Herbal preparation	4	17.39%
Glycan	1	4.35%
Vaccination		
Vaccinate and know about vaccine	15	65.22%
Vaccinate but do not know	3	13.04%
Do not vaccinate	5	21.74%
New stock introduction to the herd		
Direct	11	47.83%
Isolated	10	43.48%
After health check up	2	8.69%
Health check up by veterinarian		
Regularly (6 months)	5	21.70%
Yearly	1	4.30%
When needed	17	73.90%
Use of antibiotics		
Do	22	95.65%
Don't	1	4.35%

Antibiotic as feed supplement		
Yes	4	17.39%
No	19	82.61%
Use of human medication for animal		
Do use	12	52.17%
Don't use	11	47.83%

Independent variables and knowledge level of farmers toward zoonotic diseases

The effect of the educational qualification levels on the occurrence of zoonotic diseases among the respondents is presented in Figure 4. Majority of the respondents who were uneducated, reported occurrence of zoonotic diseases in their farms, whereas the occurrence of these diseases were found in lesser extent among the farmers with higher educational qualification. Other socio-demographic data obtained from this survey regarding farmer's age, monthly income and herd size were found to have no significant effects on the knowledge level and awareness of the small-holder farmers toward zoonotic diseases.

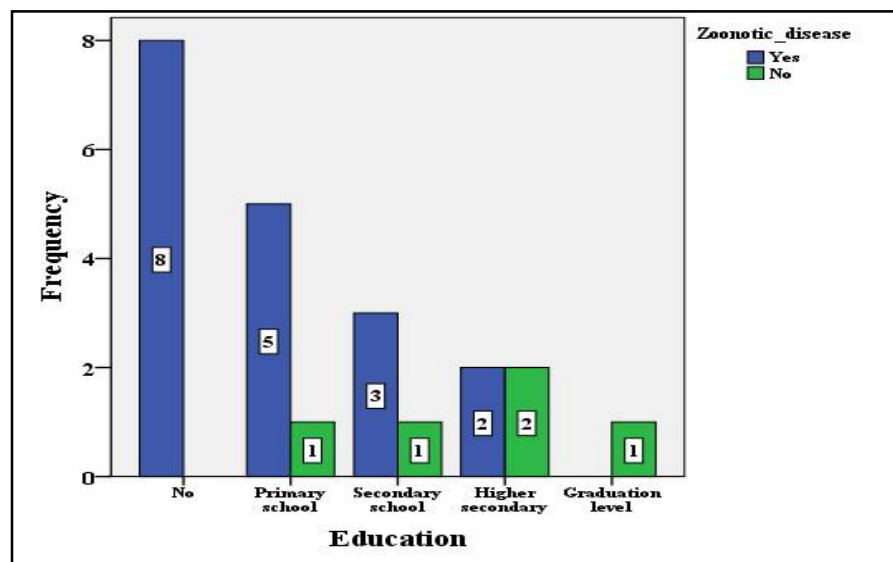


Figure 4. Effect of educational qualification levels on zoonotic diseases occurrence as reported by the respondents

4. Discussion

The interaction among people, livestock and the environment is comparatively closer particularly in developing and middle income countries, because these animals act as the means and sources of animal protein, aid in farming and generate fuels. Thus interface often results in an increased risk of zoonotic diseases transmission from animal to human and vice-versa (World Health Organization, 2015; National Research council, 2010; Rajkumar *et al.*, 2016). Moreover as most of the small scale farmers live below the poverty line. They have a little or no educational qualification, so they lack proper knowledge and awareness of raising livestock in a healthy manner and exposed

to some potential risk factors associated with zoonoses. In our study, majority of the farmers were middle aged (36-45 years) and reported farming as their source of family nutrition. It was observed that higher number of small scale livestock farmers is involved in farming as their side business and their monthly income is low indicating more arduous living standard of them (Rajkumar *et al.*, 2016). This finding is similar to that of the other studies (Rajkumar *et al.* 2016; Carletto *et al.*, 2007). Therefore they are not solely dependent on livestock rearing for their livelihood. Their main source of income was various like day laborers, stone supplier, guard, tea gardener, shop keeper and even some of them are entrepreneurs.

The alarming fact observed throughout the study was that, maximum of our respondent smallholder farmers have a little or no educational background. Hence they are more prone to be infected by the zoonoses and are less attentive to their animals due to inadequate knowledge and awareness as reported by the other authors (Munisamy *et al.*, 2017; Herrero *et al.*, 2013; Babu *et al.*, 2015; Delelegn and Girma, 2018). From previous studies it has been denoted that animal agriculture in suburban communities may result in the highest risk of zoonotic disease transmission because of generally poor living conditions, shared living spaces and competition for resources (World Bank report, 2010; Cakmur *et al.*, 2015; Roess *et al.*, 2013; Chowdhury *et al.*, 2017). The present study revealed various types of animal and environmental exposures which strongly impose risk on the occurrence of different zoonotic diseases among the farmers themselves and to their family members, these risk factors are also similar to that of Roess *et al.* (2013) and Chowdhury *et al.* (2017) (Roess *et al.*, 2013; Chowdhury *et al.*, 2017). Reliance on a common source for drinking water for human and animals is one of the potential routes of zoonotic disease transmission. Similar to the all previous studies regarding farmer's personal hygiene maintenance and farm management practices, this study has revealed that the maximum of the small scale livestock farmers share the common source of water for drinking which is vulnerable (Cakmur *et al.*, 2015; Roess *et al.*, 2013; Chowdhury *et al.*, 2017). A significant percentage of the farmers have animal sheds located adjacent to their household and they also do not use any sort of disinfectant to clean the sheds on a regular basis. All of the respondents practiced hand wash with soap after handling the animals, which is a good implication of maintaining good hygiene, but none of them use hand sanitizer or other sterilizing agents. Majority of the total interviewee who have had children below or at the age of 5 years old, allow their children in handling animals. As these children are mostly vulnerable to zoonotic diseases, so their presence in the households of the livestock farmers is one of the potential risk factors (Roess *et al.*, 2013; Hundal *et al.*, 2016a, 2016b; Zambrano *et al.*, 2014). An interesting finding of this study was that, 86.96% of the farmers are used to use smoke or coil, spray and net to protect their animals from fly or mosquitoes, while only 13.04% took no care in this regard.

Raw milk is considered as the primary mean of zoonotic disease transmission like brucellosis, mastitis etc. in dairy farm, so it could lead to hazardous health risk if left unattended (Ngongoni *et al.*, 2006; Paraffin *et al.*, 2018). In this study we found that, almost all of the small-holder dairy farmers (86.96%) have good practice of cleaning the udder of the lactating animals before milking though none of them use any sort of sanitizer to clean the udder before or after milking. This study implies similar result of previous studies (Swai *et al.*, 2010), on this aspect that the majority of the farmers are not aware of checking milk before consumption or selling to the consumers rather than organoleptic test. Therefore, all of these farm activities are considered as the potential

risk factors for the smallholder livestock farmers of the study site. The cumulative effects of these unawareness and inadequate knowledge affect the livestock farming and exert much more negative impact on the farmers and their family members by spreading zoonoses.

Interaction between human and animals is inevitable in nature. Therefore, animal diseases such as Anthrax, Food and mouth disease (FMD), Brucellosis, Bovine Tuberculosis, Tetanus, Mastitis, and Rabies etc. are some of the potential zoonoses (World Health Organization, 2006). According to the present study, only 47.83% of these smallholder farmers of the targeted area are familiar with various zoonotic diseases and the other 52.17% do not have any clear concept of this. Most of the livestock holders are unaware of the fact that, zoonotic diseases could be transmitted from the animal originated products, like milk, meat or eggs rather than physical contact between the infected individuals (Hundal *et al.*, 2016b).

Hundal *et al.* (2016) reported Rabies and Brucellosis were the two most important diseases in the Punjab of India. On the other hand, our study revealed that, FMD is the most familiar disease to the smallholder farmers of this locality. This is possibly due to the prevalence of FMD and Tetanus in Sylhet. A large number of farmers did have soil made floor in their animal sheds rather than concrete made floor. Thus the soil, dust etc. may act as the carriers and spread the risk of Tetanus in this locality. They are also familiar with some other diseases like Anthrax, Mastitis, Rabies and bovine tuberculosis. Least of them have knowledge of Brucellosis. However, only a few of them actually knew the route of transmission, treatment and prevention procedure of these zoonotic diseases. Rajkumar *et al.* (2016) reported 43.2% of the respondents had FMD outbreak in their cattle in their study (Rajkumar *et al.*, 2016). In contrast, the present study indicated that, 100% of the respondents are familiar with FMD; 65.22% mentioned about Anthrax, 60.87% Rabies and Mastitis, 73.91% Tetanus, 26.09% Brucellosis and only 13.04% mentioned about bovine tuberculosis as zoonotic diseases most likely to the other studies (Cakmur *et al.*, 2015; Herrero *et al.*, 2013; Hundal *et al.*, 2016b; Tebug *et al.*, 2015). In addition 34.78%, 56.52%, 73.91% and 95.65% of them have knowledge regarding transmission of FMD, Anthrax, Tetanus and Rabies respectively. They identified bloat and diarrhea as the most common enteric diseases of the cattle which might be transmissible to human.

The global economy has endured more than \$200 billion loss over the last decade because of the outbreaks of a number of zoonotic diseases (World Bank, 2010; Cakmur *et al.*, 2015). Similarly this survey reported that, 15 of the total respondents farmers experienced FMD in their farms and all of them have suffered economic loss of about 1000-2000/= (BDT) due to this disease. One of the farmers admitted that his animals suffer from this particular disease almost every year. Though 65.22% of the smallholder farmers are familiar with Anthrax, but 56.52% of them have perception about transmitting this disease while only 17.34% are used to practice vaccination against it.

Most of the farmers mentioned about the wounds on hoof and mouth along with foot deformities as the common symptoms of tetanus. However, 73.91% of them do not know the fact that unhygienic process of castration, hoof trimming and dehorning of animals plays significant role in causing and transmitting Tetanus.

Besides these three diseases, 95.65% small scale farmer mentioned about Rabies as a potential zoonotic infection, but they could not provide positive response of any further questions regarding vaccination, treatment etc. against rabies other than the means of transmission.

It was observed from the current survey, most of the farms in the study area hold small herd sizes between 2 to 6 and only 4.30% of the sampled farms were rearing more than 20 cows. This finding is similar to another study in this field (Hundal *et al.*, 2016b). Smallholder farmers with low monthly income could not maintain proper hygiene intentionally or unintentionally. Alliance of unawareness with the previous aspects worsens the situation (Lowenstein *et al.*, 2016).

For smallholder farmers vaccination and regular checkup of the animals in their farms by veterinarian is beyond their reach due to their low monthly income, if such services were available they would be benefited. Less than half of the respondents (47.83%) follow prescribed medicines according to the expert veterinarians for the primary treatment of the diseased animals, whereas a significant portion of them (34.70%) still use medicines suggested by the local pharmacists and some of them (17.39%) rely on the traditional herbal preparations of their own. These herbal preparations include ginger pest, garlic pest, extracts of Chinese roses and other herbs. Notably, this survey indicated that, most of the farmers (78.26%) involved in this study think of vaccination as the prevention against all diseases.

The possible reason of poor knowledge and unawareness about zoonotic diseases among the farmers in these suburban areas could be their socio-demographic position. Major constraints like less scope of education, unavailability of government aid and inadequate training programs attribute largely to this situation.

All the factors revealed throughout our study could be most possible risk factors of transmitting zoonoses in the targeted population of this area. Although there was no statistically significant relation found between these factors and occurrence of zoonotic diseases except for different groups of education levels of farmers in our findings like the authors in (Hundal *et al.*, 2016b; Biswas *et al.*, 2008). They observed that, there was a reciprocal linkage between the knowledge level of the small scale farmers and prevalence of zoonoses for particular area. However, our study implied that, the farmers with higher education experienced low frequency of zoonoses while farmers of primary education or illiterate group have had experienced higher rate of zoonoses. Lack of education also promotes the use of human medicine to treat infected animals and misuse of antibiotics regardless of prescription which lead to multidrug resistance development among the animals.

Despite of all of this assessment, there were some limitations of this study. As this survey comprises only the suburban area of Sylhet, Bangladesh, so the results demonstrated here may not generalize that of the other parts of Bangladesh. Also the random selection of small data set due to inadequate fund and duration of sampling might affect the total outcome of the survey.

5. Conclusion

This study identified some of the potential risk factors associated with the traditional animal management and hygiene practices in the study area similar to those of the other rural areas of Bangladesh. Moreover, it can be concluded that, irrespective of different socio-demographic positions majority of the smallholder farmers of this area have lack of proper knowledge and awareness regarding various zoonotic diseases. As a result most often either they themselves or their animals do suffer and endure loss. Therefore, this study recommends developing coordinated, thorough and effective training programs for the small scale farmers to enlighten them to ensure fewer risks of

zoonotic diseases. Improvement of knowledge and awareness among the farmers can minimize the potential risk factors and encourage good farm management practices to prevent zoonoses among the farmers and in their farms.

Acknowledgements

We would like to thank the students of the Faculty of Biotechnology and Genetic Engineering from Sylhet Agricultural University for their assistance during data collection. We also extend our gratitude and heartiest thank to the local farmers and their families who participated in this study.

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Published online: 16.04.2018