

RESEARCH ARTICLE

KNOWLEDGE, ATTITUDE AND PRACTICES (KAP) REGARDING ZONOTIC DISEASES AMONG SMALLHOLDER LIVESTOCK OWNERS OF TULSIPUR SUB-METROPOLITAN CITY, NEPAL

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ABSTRACT

A questionnaire based study was conducted in Tulsipur sub-metropolitan city to assess the community's knowledge, attitude, and practice on zoonosis. A total of 177 participants from 19 different wards were purposively selected and requested to answer the questionnaire. The educational level of farmers was positively associated with their knowledge towards zoonosis ($P < 0.05$) in which farmers with lower educational background had less knowledge about zoonosis. The respondents' attitude towards zoonotic disease prevention & control was found to be statistically significant with the educational background. Among those who have a positive perception of zoonotic prevention, about 25.3% of respondents were having college and university education while 52.6% of those who didn't have a positive perception of the zoonotic disease prevention were illiterate. The educational level of the respondents was statistically significant with their practices towards zoonotic diseases ($P < 0.05$). Respondents who had lower educational levels consumed raw milk, dead animals and assisted during parturition and other animal diseases without safety measures. Community education and awareness programmes are to be defined and further investigations on prevalence and risk factors for zoonosis in such settings will be necessary to define intervention targets.

KEYWORDS

zoonosis, knowledge, attitude, practice, education

1. INTRODUCTION

Living things living together constantly interact with each other. Once the balance between these entities in the nature is impaired, the life is imperiled reciprocally and consequently different hazards such as zoonotic diseases are developed. Zoonoses are defined as "those diseases and infections which are naturally transmitted between vertebrate animals and man" by the WHO in 1959. Nearly two-thirds (61%) of the pathogens that are known to cause human diseases are zoonoses, and of the livestock pathogens, 243 out of 616 (39.4%) also infect humans (Cleaveland et al., 2001).

Livestock is a key asset to reduce poverty and to meet livelihood needs among farmers (Perry & Grace, 2009). Animal diseases including zoonoses are the important constraints in the enhancement of livestock production systems. Zoonotic diseases harmful to animal health are not only important because of the economic losses affecting the meat, milk and wool products but also because of their effects on food safety (Kang'ethe et al., 2012). Various transboundary, zoonotic and food borne diseases have high significance among poor population and entire national economy (Biroi et al., 2010). Diseases like rabies and tuberculosis affect the lives of many humans every year in developing countries across the globe.

Zoonotic diseases can affect the life and economy of developing countries like Nepal (Halliday et al., 2015). Many zoonotic pathogens are a serious animal and public health concern in developing countries. Many cases of zoonotic diseases are documented every year across different regions of the country. For example, about 100 livestock and 10–100 human deaths from rabies per year (Devleesschauwer et al., 2016) and

neurocysticercosis and congenital toxoplasmosis burden (Devleesschauwer et al., 2014) was reported in Nepal.

Many zoonotic diseases pose a significant occupational health hazards (Lejeune & Kersting, 2010). Livestock owners have different type and intensity of human–livestock contacts which may result in transmission of microorganisms and associated zoonoses (Klous, Huss, Heederik, & Coutinho, 2016). Livestock owner are constantly exposed to various zoonotic pathogens (Thomas et al., 1999). Various viral diseases of animal origin like Nipah virus, Hanta virus and Menangle virus have been reported to infect livestock owners across different countries (Lessenger, 2006).

To minimize the occurrence of zoonotic diseases in human as well as livestock populations, knowledge on transmission, prevention and control measures of zoonotic diseases should be imparted to livestock farmers. Therefore, the current study was conducted with the objective to assess community knowledge, attitude and practices (KAP) on zoonotic diseases among livestock farmers for the better understanding of necessary interventions needed for policy development and community awareness programs.

2. MATERIALS AND METHODOLOGY

2.1 Study design and population

A Quantitative Descriptive method was employed in this study to determine the KAP regarding zoonosis among small holder livestock owners.

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2.2 Study Area

The study area is located in Province no. 5 in Nepal. The study will be carried out in Tulsipur sub-metropolitan office and lies between 28°07'24.00" N & 82°17'26.40" E in the Dang district of Nepal. Tulsipur has a humid, subtropical climate which is dominated by monsoon.

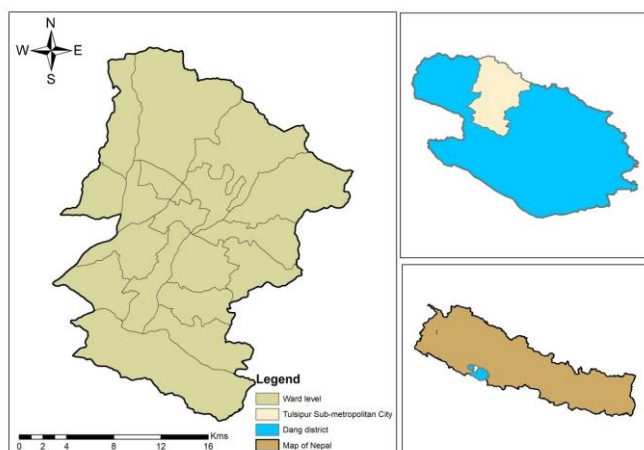


Figure 1: Map of study area

2.3 Study Methods

2.3.1 Target and study population

The target population comprised of livestock (cattle/buffalo/sheep/goat/pig) farmers belonging to 19 wards of Tulsipur Sub-metropolitan city. The research team visited the villages and purposive sampling was carried out and requested livestock farmers at community sites to participate in the study. The participant information statement explaining the purpose of the study was provided to all the participants and written consent was obtained from the participants indicating their willingness to participate in this study. After this, the participants were asked to complete a questionnaire to assess their KAP relating to zoonotic diseases. The participants were offered the questionnaire either in English or in the local language (Nepali). After completion of the questionnaire, participants were provided with information brochures explaining prevention and control measures of important zoonotic diseases.

2.3.2 Questionnaire design and data collection

The questionnaire was developed in Nepali language to collect detailed information on farmers demographics and farmers awareness related to zoonotic diseases. The socio-demographic information collected included age, gender, family size, and the educational qualifications. For assessing knowledge of the livestock farmers, the basic questions were asked about endemic or important zoonotic diseases such as brucellosis, rabies, tuberculosis, plague, swine flu, taeniasis, hydatidosis, toxoplasmosis and ringworm. The farmers were asked if they have heard about these diseases and were later told to identify animal hosts associated with the transmission of these zoonotic pathogens. The answer was only considered 'correct' if the farmer was able to correctly identify at least one of the animal hosts; however additional selection of an animal host not related to the disease was considered as an incorrect reply. To assess attitude of farmers, information related to disposal of carcasses and deworming practices were also collected. Questionnaire related to animal deworming practices, the habit of consuming raw milk, washing hands after contact with animals, the habit of walking bare feet at home or at the farm and testing of the herds for brucellosis or tuberculosis was asked to collect information regarding practices of livestock owner (Singh et al., 2019).

2.4 Data analysis

The data was collated and presented using descriptive statistics. Frequency and percentages were used for statistical analysis. Data analysis was done with the help of SPSS v25 and MS-Excel spreadsheets.

3. RESULTS

3.1 Socio-Demographic Status of Respondents

A total of 177 respondents were included in this survey study with 18% of the non-response rate. The study included majority of male respondents (78.5%) and about 17.5% were illiterate. About 57.1% were between 26-

50 years of age which is the most productive age. The majority of the respondents were reported to be Hindu (94.3) rather than other religions. The primary occupation as agriculture was found among 46.3% of respondents followed by business and household.

Table 1: Socio-demographic characteristics of respondents in Tulsipur Sub-metropolitan City

Variables		Frequency	Percentage
Sex	Male	139	78.5
	Female	38	21.5
Age	10-25	19	10.7
	26-50	101	57.1
	50 and above	57	32.2
Religion	Hindu	167	94.3
	Christian	7	4
	Buddhist	3	1.7
Education	Primary	71	40.1
	Secondary	35	19.8
	Diploma	13	7.3
	Undergraduate	27	15.3
	None	31	17.5
Ethnicity	Brahmin	35	19.8
	Chhetri	74	41.8
	Magar	13	7.3
	Tharu	43	24.3
	Dalit	10	5.6
	Gurung	2	1.1
Occupation	Farmer	82	46.3
	Business	44	24.9
	Household	29	16.4
	Teacher	7	4.0
	Daily wage worker	4	2.3
	Ex-army	3	1.7
	Student	8	4.5
	Average monthly income	10000-30000	106
30000-80000	57	32.1	
80000-150000	7	4.0	
More than 150000	7	4.0	

3.2 Knowledge of the Respondents on Zoonotic Disease

Of the 177 respondents, 131(74%) of respondents had known about the term zoonosis. The association of sex, age, religion, education level, ethnicity, occupation and average monthly income of the respondent with knowledge related to zoonotic disease was analyzed using chi-square. The result showed that males had higher knowledge of the zoonotic disease (75.5%) than females and there was no statistically significant difference ($P>0.05$) between sex of respondent and knowledge about zoonosis. Similarly, the age of respondents and religion were also non-significantly associated with knowledge about zoonotic disease.

The education status of respondents was statistically significant ($P < 0.05$) and associated with the knowledge of respondents towards zoonosis. The respondents who either had completed or were receiving diploma and graduate level had higher knowledge (100%) followed by primary level. Likewise, ethnicity was also significantly associated with knowledge and Gurung community showed the higher knowledge (100%) followed by Brahmin (91.4). Similarly, statistically significant association was observed in occupation and average monthly income of the respondents. The findings showed that teacher and ex-army had better knowledge of zoonotic disease (100%) followed by farmer (80.5%).

Table 2: Knowledge of respondents regarding zoonotic disease in Tulsipur					
Variables		Knowledge on zoonosis			
		Yes(%)	No(%)	Chi-square (X ²)	P-value
Sex	Male	75.5	24.5	0.786	0.375
	Female	68.4	31.6		
Age	10-25	68.4	31.6	1.288	0.525
	26-50	77.2	22.8		
	50 and above	70.2	29.8		
Religion	Hindu	74.3	25.7	2.094	0.351
	Christian	57.1	42.9		
	Buddhist	100	0		
Education	Primary	80.3	19.7	32.836	0.00
	Secondary	51.4	48.6		
	Diploma	100.0	0.0		
	Graduate	100.0	0.0		
	None	51.6	48.4		
Ethnicity	Brahmin	91.4	8.6	13.339	0.02
	Chhetri	77.0	33.0		
	Magar	61.5	38.5		
	Tharu	58.1	41.9		
	Dalit	70.0	30.0		
	Gurung	100.0	0.0		
Occupation	Farmer	80.5	19.5	33.79	0.00
	Business	70.5	29.5		
	Household	79.3	20.7		
	Teacher	100.0	0.0		
	Daily wage worker	25.0	75.0		
	Ex-army	100.0	0.0		
	Student	0.0	100.0		
Average monthly income	10000-30000	66.0	34.0	9.543	0.023
	30000-80000	84.2	25.8		
	80000-150000	85.7	23.3		
	More than 150000	100.0	0.0		

The study (Figure 2) revealed that about 89.3%, 82.5%, 76.8%, 69.5%, 63.8%, 44.67% and 44.6% of respondents were aware about zoonotic nature of Rabies, FMD, Japanese Encephalitis, Swine flu, Ringworm, Taeniasis and Brucellosis respectively whereas only 14.1% and 2.8% of livestock owners had known about hydatidosis and toxoplasmosis respectively. Only 26% of farmers had knowledge about the transmission of Tuberculosis from aerosols, raw milk, and raw uncooked meal and polluted environment. 77.4% of respondents had known about zoonotic nature of Bird flu and this might be due to the fact that media coverage of Avian influenza outbreaks are high around the globe.

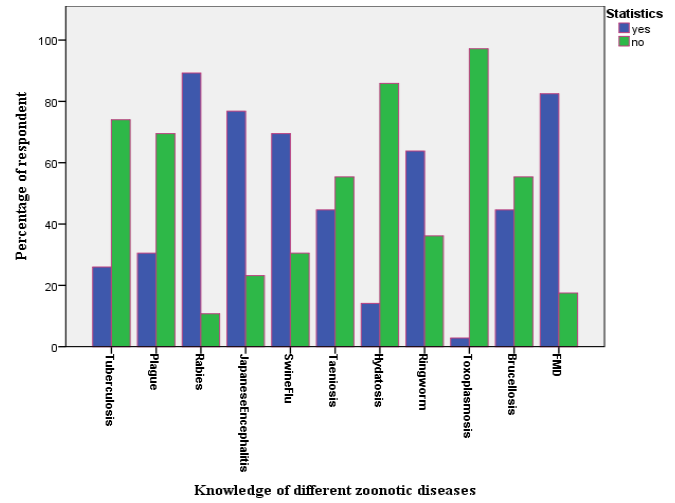


Figure 2: Knowledge of different zoonotic diseases among respondents

As far as knowledge related to animals responsible for transmission of zoonotic diseases were concerned (Figure 3), most of the farmers i.e.145(81.9%) accurately identified dog as an important source for transmission of rabies, however only 25(14.1%) identified dog as responsible for transmitting hydatidosis.

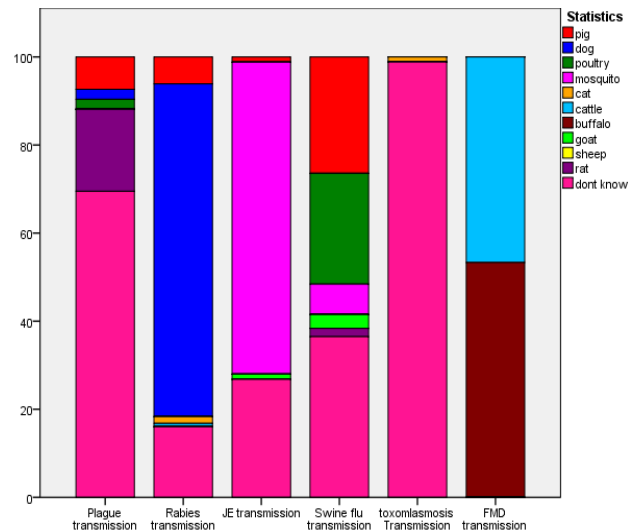


Figure 3: Knowledge about transmission agents of different zoonotic diseases

3.3 Attitude of the Respondents on Zoonotic Disease with respect to their educational level

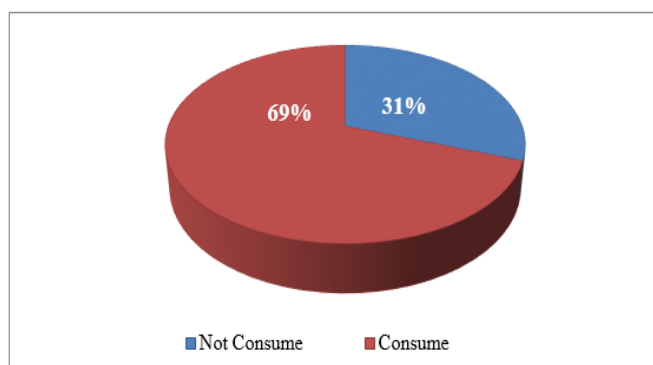
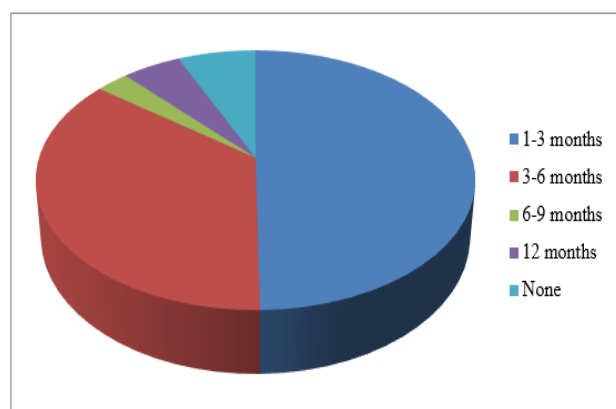
The attitude of respondents on zoonotic disease prevention and control with their educational level was assessed and the study revealed that statistically significant differences ($P < 0.05$) were observed. However, the association of consumption of dead animal and education level was statistically insignificant ($P > 0.05$).

Of those who had positive perception about zoonotic disease prevention, majority of respondents had received some education from educational institutions while 52.6% of those who didn't have positive attitude were illiterate. Similarly, majority of respondents who had received education had positive perception towards deworming of animals and disposal of carcass of diseased animal while 50% respondents having negative perception didn't received any education.

Table 3: Comparison of educational level with the Attitude of respondents regarding zoonotic disease

Variables		Attitude vs Educational status of respondents						Chi-Square (X ²)	P-Value
		Primary N (%)	Secondary N (%)	Diploma N (%)	Graduate N (%)	None N (%)			
Do you think animal died of disease should be dumped and covered in lime?	Yes	67(40.9)	33(20.1)	13(7.9)	27(16.5)	24(14.6)	14.187	0.007	
	No	4(30.8)	2(15.4)	0(0)	0(0)	7(53.8)			
Do you think animal should be dewormed?	Yes	67(40.6)	33(20.0)	13(7.9)	27(16.4)	25(15.2)	10.876	0.028	
	No	4(33.3)	2(16.7)	0(0)	0(0)	6(50)			
Do you think dead animal should not be used for consumption?	Yes	21(38.9)	9(16.7)	6(11.1)	11(20.4)	7(13.0)	4.162	0.385	
	No	50(40.7)	26(21.1)	7(5.7)	16(13.0)	24(19.24)			
Do you think Zoonotic diseases are preventable?	Yes	62(39.8)	35(22.2)	13(8.2)	27(17.1)	21(13.3)	24.286	0.00	
	No	9(47.4)	0(0)	0(0)	0(0)	10(52.6)			

The study showed that though many respondents had positive attitude towards proper disposal of carcass of diseases animals, 69% of respondents (Figure 4) still believed that it is not a bad practice to consume dead animals if they don't show any signs of disease before death. Also, 93.2% of respondents had positive attitude that animals should have to be dewormed. 50% and 36 % of livestock owners responded that deworming interval should be 1-3 months and 4-6 months respectively (Figure 5).

**Figure 4:** Dead animal consumption behavior of respondents**Figure 5:** Attitude towards deworming interval among respondents

3.4 Practice of the Respondents on Zoonotic Disease based on educational level

The practice of the respondents towards zoonotic diseases along different educational levels was assessed and the result indicated significant relationship between these variables (Table 4). People with lower education level were found to drink raw milk, prefer walking bare feet at home and farm or garden and assisting more during parturition or abortion. 29.8% and 23.4% of respondents who didn't wash their hands after contact with animals were illiterate and primarily educated respectively. However, deworming of animals was not significantly associated with educational status of respondents as each group showed

positive practice towards deworming.

The practice of testing of animals for Tuberculosis and Brucellosis was not observed. Similarly, no farmer vaccinated their livestock against diseases like TB, Brucellosis, Rabies and FMD.

4. DISCUSSIONS

This study revealed a limited awareness of livestock-associated zoonoses among smallholder farmers in Nepal. Knowledge towards zoonotic disease was observed in 74% of respondents compared to study from central Nepal where only 55% of farmers being aware about disease transmission between animal and humans (Kelly et al., 2018). While several farmers were aware of the zoonotic potential of rabies virus and Foot & Mouth disease, there was low awareness of other important livestock-associated zoonoses in Nepal, such as tuberculosis, brucellosis, toxoplasmosis and parasitic diseases. Knowledge on zoonotic diseases was found to be minimal in farmers who were illiterate or hadn't received any formal education. The results from survey of small holders livestock owners from central Nepal (Kelly et al., 2018), Tajikistan (Lindahl et al., 2015) and Senegal (Tebug et al., 2015) has found similar results.

In this study, though majority of respondents had positive knowledge & attitude towards the zoonotic disease prevention, it was not associated with practice of the farmers. The possible reasons for this gap in the awareness and practice might be due to the limited knowledge about modes of transmission for these diseases, their perception about risk of these diseases and their capacity to implement these practices on their farms. As for instance, the cases of abortions were frequently observed among different species of animals, none of the respondents have ever tested nor vaccinated their livestock against Brucellosis. Previous studies have shown the presence of Brucellosis in cattle, buffaloes, goats, swine and yak (Jackson et al., 2014; Mishra et al., 2009; Pandeya et al., 2013; Shrestha et al., 2008).

Majority of respondents (9.6%) practiced drinking raw milk in this study which is higher compared to another study where none of them practiced drinking raw milk (Kelly et al., 2018). In agreement with the current finding, 23.9% and 95.0% of farmers consumed raw milk in Punjab, India (Singh et al., 2019) and Senegal (Tebug et al., 2015) respectively. Deworming practice was carried out by 91.5% of livestock owners in current study which is greater than a study from Punjab where only 72.52% practiced use of anthelmintic drugs. Few farmers believed that they were exposed with digestive and/or skin related zoonosis. Almost half of the respondents were confident that zoonosis is a public health concern.

The attitude and practices of livestock farmers present several potential risks. For example, consuming raw milk is a potential risk for transmission of brucellosis and tuberculosis. Similarly, farmers could get infected with cutaneous larval migrans while walking barefoot on farm and garden. Farmers are likely to get infected with diseases like TB and Brucellosis as they do not care about disposing carcass of animals. Deworming practices seem to minimize threats of zoonotic infections from parasites like cysticercosis, taeniasis and hydatidosis.

Table 4: Comparison of educational level with the practice of respondents regarding zoonotic diseases

Variables		Practice vs Educational status of respondents						
		Primary N (%)	Secondary N (%)	Diploma N (%)	Graduate N (%)	None N (%)	Chi-Square (X ²)	P-Value
Do you drink raw milk?	Yes	11(64.7)	0(0)	0(0)	0(0)	6(23.1)	14.119	0.007
	No	60(37.5)	35(21.9)	13(8.1)	27(16.9)	25(15.6)		
Do you wash your hands after contact with animals?	Yes	60(46.2)	23(17.7)	8(6.2)	22(16.9)	17(13.1)	12.869	0.012
	No	11(23.4)	12(25.5)	5(10.6)	5(10.6)	14(29.8)		
Do you prefer walking bare feet at home?	Yes	23(35.4)	15(23.1)	7(10.8)	4(6.2)	16(24.6)	111.314	0.023
	No	48(42.9)	20(17.9)	6(5.4)	23(20.5)	15(13.4)		
Do you prefer walking bare feet at farm or garden?	Yes	18(46.2)	2(5.1)	0(0)	4(10.3)	15(38.5)	22.907	0.00
	No	53(38.4)	33(23.9)	13(9.4)	23(16.7)	16(11.6)		
Have you ever done deworming of your animals?	Yes	64(39.5)	33(20.4)	13(8.0)	27(16.7)	25(15.4)	8.954	0.062
	No	7(46.7)	2(13.3)	0(0.0)	0(0.0)	6(40.00)		
Do you ever assist your animal during parturition or abortion?	Yes	20(76.9)	0(0.0)	0(0.0)	4(15.4)	2(7.7)	20.239	0.00
	No	51(33.8)	35(23.5)	13(8.6)	23(15.2)	29(19.2)		

5. CONCLUSION

This cross-sectional study has assessed the knowledge, attitude, and practices of residents of Tulsipur sub-metropolitan city towards zoonotic diseases and the role of education towards their attitude and practices with regard to zoonotic diseases. The results of the present study suggest that zoonotic infection could pose a significant health risk in the study population. Practicing high-risk behaviors such as consumption of raw milk, dead animals and assisting animals during parturition reveals low knowledge level of zoonotic diseases among small holder livestock owners. Continued efforts should be directed to promote existing and additional practices to reduce the risk of zoonotic pathogen transmission. The awareness of farmers towards zoonosis was limited among farmers who hadn't received formal education, so basic training on zoonosis and public health should be provided to all the livestock owners. Also, mass media communications such as radio and television talks, and newspaper articles on the prevention and control of zoonotic diseases could also improve livestock farmer's knowledge and practices relating to zoonotic diseases. To define the intervention targets, further investigations on prevalence and risk factors for zoonosis in such settings will be necessary.

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