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Keywords: zoonoses, pet keeping, education, kathmandu, perception, owners.

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Zoonotic Risk for Pet Owners in Kathmandu, Nepal

Kosh Bilash Bagale [α], Basanta Gaire [σ] & Ramesh Adhikari [ρ]

Abstract- Pet keeping practices have a long history in human societies, butpoor knowledge regarding pet keep ingincreases risk of several zoonoses. The aim of this study is to identify the risk of zoonoses based on knowledge, practices, and perception of threat among pet owners in Kathmandu. A cross-sectional questionnaire based study was conducted on 143 purposively selected pet owners from different three wards in Kathmandu metropolitan. Most of the respondents 86.7% (n=143) were keeping dog as a pet in their households. Feeding practices for pet was varied based on economic status where almost a fifth (18%) owners feeding readymade food. The purpose of pets keeping found diverse where most of them kept forpurpose of household security (37.76%). All respondents were literate among them 88.11% of respondents had above secondary level qualifications. The majority of respondents received information from radio/television (92.30%). Compare with knowledge on common zoonoses (like; salmonellosis (11.9%), toxoplasmosis (7.0%), pet- related allergy (41.3%)) found poor. But, most of the respondents (99.3%) had good knowledge about rabies, however, only half (52.44%) had knowledge about freely availability of anti-rabies vaccine (ARV) in government hospitals. The study area, almost four out of five (79 %) owners still practice open defecation for their pets. Data showed the association between level of education and threats perception on zoonoses. It is suggested that short orientation sessions about pet handling and zoonoses prevention practices should be provided to people interested to keep pets.

Keywords: zoonoses, pet keeping, education, kathmandu, perception, owners.

I. Introduction

Pet keeping practices have a long history in human societies. Mahabharata, which is the great Hindu epic, mentions that Yudhishthir, the great follower of the PATH OF DHARMA, had a dog as a pet (Mahabharata, MAHA- PRASTHANI PARVA). He had refused to pass the gate of heaven without his dog. Pet keeping practice is continuing in the modern age with diverse species of pets, and is now a symbol of modernization all over the world. In the context of Nepal, pet keeping practice is growing among the city dwellers. Dog, cat, different types of birds, reptiles are the common rearing pet in Nepal; however, it depends on people's passions and desires.

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There are several benefits of pet keeping like; health benefits through increasing the opportunity to exercise; regular walking or playing with a pet can decrease blood pressure, emotional and social benefits (Stull, Brophy & Weese, 2015). Similarly pet can help manage loneliness and depression by giving us companionship as well as security to households and society by some kinds of pet, i.e., dog.

However, pets can be the source of several zoonotic diseases in different way. Pets can transmit infections to human either as a host (primary or secondary) or as healthy or asymptomatic carrier. Diseases which are transmitted between animal to human or vice versa are called zoonoses. World Health Organization (WHO) defines, 'Zoonoses are those diseases and infections which are naturally transmitted between vertebrate animals and human'. There are several zoonotic diseases prevalent in the world, often occurring as endemic, epidemic, or pandemic.

The three recent worldwide viral outbreaks, namely SARS (Severe Acute Respiratory syndromes), the bird flu (H5N1), and the swine flu (H1N1), are all examples of zoonoses. Even the HIV is believed to be transmitted from chimpanzee to humans in the last century (Basnyat, 2013). Likewise, ongoing pandemic of "Novel Corona Virus (CoVID-19) outbreaks from China and terrifies all over the world with many fatal outcomes. According to WHO daily press conference of last April 2020, more than two hundred countries of the world affected by the disease; however, USA, Spain, Italy, UK, China are badly affected by the disease until March 2020 and, still now it is spreading rapidly throughout the world. Although the source of COVID- 19 is not exactly determined by the epidemiologist, but they had concluded that this is from animal sources (zoonoses).

So based on facts and findings, most of the human diseases (more than 60 percent) come from animal sources (Niroula, 2016) and also due to illiteracy, poverty, or might be negligence –pet owners are exposed to the risk of zoonotic diseases. People who are in close contact with animals (pets) and have inadequate knowledge or poor practices are more susceptible to zoonoses. Livestock farmers, veterinarians, para veterinarians are close to animals due to their profession, and pet owners are also close to their pets. Similarly, most of them keep their pets inside the house and even in the same bed. Some people enjoy pets by kissing pets and playing with them.

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Due to the lack of proper studies, we have not actual data about incidence and prevalence of pet-related zoonoses in Nepal and also have not an idea about the knowledge, practices, and perception related to zoonoses among pet owners. So this study tries to identify the risk of zoonoses among pet owners in Kathmandu Nepal based on their existing knowledge, practices and perceived threats related to zoonoses and explore the factors associated with it.

II. Method

This study was descriptive and cross-sectional study design. Data was collected from three randomly selected wards of Kathmandu metropolitan (ward no 3, 16, and 26). All the respondents who visited the park of these three wards were interviewed. A total of 143 pet owners were the sample of the study.

III. Data Collection Procedure

Respondents were interviewed with a semi-structure questionnaire on different aspects of pet management knowledge, practices, and perception on zoonotic diseases. The questionnaire was prepared and pre -tested before the final data collection. Researchers visited the Pet owners on the respected wards (parks). Afterd is closing the purpose and methods to the respondents, the researcher started collecting the information from the respondents.

IV. Ethical Approval

No ethical approval was required for this study, as it was a survey-based study. However, verbal consent was taken during data collection process from all participants.

V. Results

After the interview every questionnaire was checked thoroughly. Questionnaires containing any obscure or misunderstood answered were excluded during the final data analysis. Data were entered into MS excel and exported into IBM SPSS 20 version for descriptive data analysis.

Table 1: Socio- demographic characteristics of the respondents

Description	Frequency (n= 143)	Percent
Age in year		
20 – 29	19	13.28
30 – 39	49	34.26
40 – 49	42	29.37
50 – 59	22	15.38
60 – 69	8	5.59
Above 70	3	2.097
Ethnicity		
Dalits	2	1.4
Janajati	65	45.5
Barmin/Chettri	75	52.4
Others	1	0.7
Religion		
Hindu	120	83.9
Buddies	19	13.3
Christian	2	1.4
Muslim	1	0.7
Others	1	0.7
Education status		
Basic Education (1-8)	16	11.18
Higher Secondary (9-12)	69	48.3
Above Bachelor	58	40.55
Average monthly income		
Below 50,000	108	75.52
Above 50,000	35	24.47
Species of pet		
Dog	124	86.7
Cat	18	12.58

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Others (Tortoise)	1	0.7
Purpose of pet keeping		
Security	54	37.76
Self-hobby	43	30.06
Children pressure	33	23.07
Other	13	9.09

Table 1 reveals the socio -demographic status of the respondents. Among 143 respondents, a higher percentage were 30-39 years 49 (43.26%), and least 3 (2.09%) were above70. The majority of the respondents, 75 (52.4%), were Brahmin/ Chettri. Likewise, Janajati were 65 (45.5%), and Dalits were 2 (1.4%). Basis of religion, most of the respondents 120 (83.9%) were Hindu, and 19 (13.3%) were Buddhists. Christian and Muslim were very negligible 1.4 and 0.7 percentages respectively. All respondents found literate and, most of them, 126 (88.11%) had a more than higher secondary education. Economically most of the respondents 108 (75.52%) were below fifty thousand average monthly income (n=143). Most of the pet owners, 124 (86.7%) kept dogs, 18 (12.58%) kept cats, and only 1 (0.7%) kept tortoise as a pet in their households. Likewise, 54 (37.76%), 43 (30.06%), 33 (23.07%) respondents kept their pet for security, self-hobby and children pressure respectively, but 13 (9.09%) were not any specific purpose.

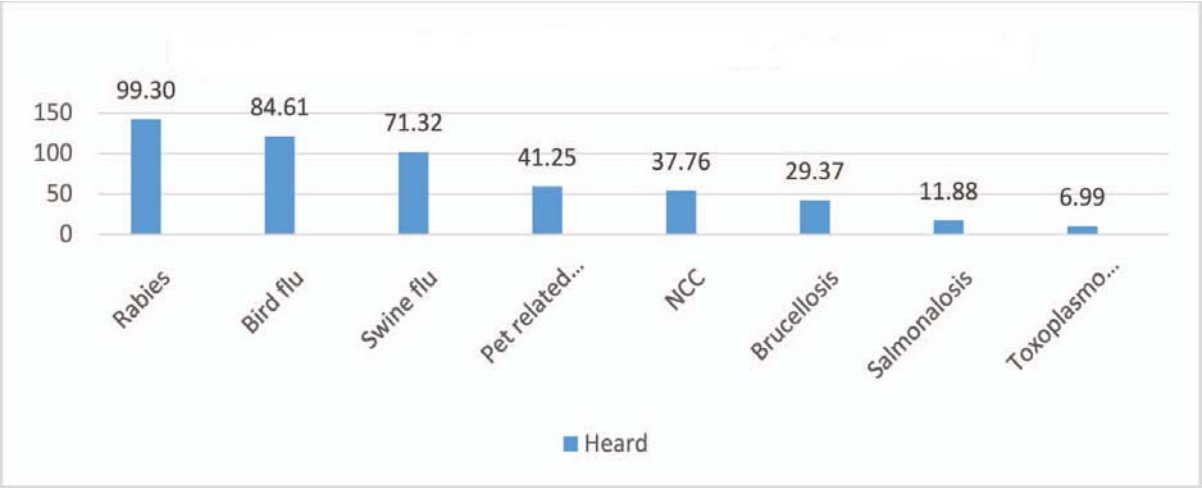


Figure 1: Heard about the Zoonotic Diseases n=143

Figure 1 shows that almost all 142 (99.3%) respondents had heard about rabies. Similarly, more than two-third of the respondents had heard about bird flu and swine flu, but still, only 41.25%, 37.76%, 29.37%, 11.88%, and 6.9% had heard about pet related allergy, Neuro-cysticercos is (NCC), brucellosis, salmonellas is, and toxoplasmosis respectively. Similarly among 143 respondents, the majority (138, 96.50%) had agreed that their pets could be the source of zoonotic disease.

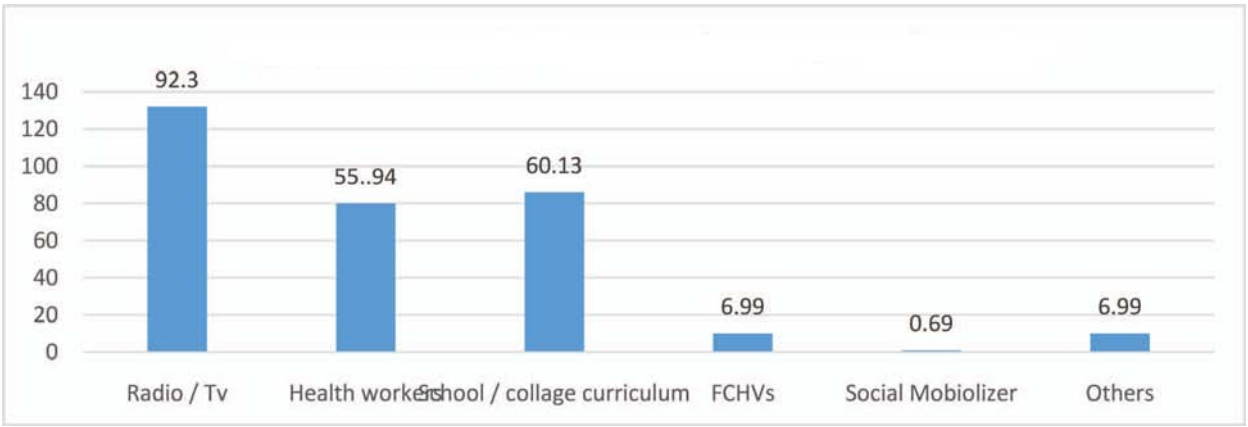


Figure 2: Sources of information about Zoonoes (n=143)

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Figure2 showed that pet owners obtained the information from more than one source. Most of the respondents, 132 (92.3%) said that their sources of knowledge about zoonoses was radio/television. Health workers were also found to be are mark able source of information for zoonoses 80 (55.9%). 86 (60.1%) respondents learned that knowledge from the school/college curriculum. Female Community Health Volunteers (FCHVs) were sources of information for 10 (7.0%) respondents. But in contrast, social mobilizers who are main agents of communication in societies were found to have a minimal role in disseminating information about zoonoses (1, 0.7%).

Results showed that most of the respondents (134, 93.7%) followed the recommended vaccination schedule. However, few (8, 5.6%) pet owners never provided vaccines for their pets. The reason for not immunizing pets was lack of information (6, 60%) and lack of time (2, 40%).

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

Exposure		Frequency n= 143
Description	Number	Percentage
Consultation during sickness of pet		
Consult the Vet	130	90.90
Conservative therapy	13	9.1
Place of pet keeping at night		
Outside the door	21	14.68
Inside the door but separate	116	81.11
Same bed with owners or members	6	4.19
Bathing schedule of the pet		
Monthly	49	34.26
If necessary	94	65.73
Place of defecation		
Own house	30	20.97
Street/ park	113	79.03
Food for pets		
Left-over food	6	4.19
Readymade foods from market	27	18.88
Same food as family member	110	76.92

Table 2 showed that most of the pet owners followed the safety measures. Out of 143 respondents, 90.90% consult the vet during the sickness of their pets, but 9.0% of them still go for conservative practices. Similarly, 14.68% of respondents had kept their petsout side the living room, 81.11%had kept inside the room on separate places, but around 4.0%ofrespondents replied that keep their pets in their living room and sometimes in the same bed. Likewise 79.03% of pet owners used public places (road or park) for defecation to their pets. However, all respondents who had cats as pets used to defecate pets inside their house. Feeding practices showed that 76.92% used the same food for family members and pets, 4.19% were giving leftover food, and 18.88% provided readymade food bought from the market.

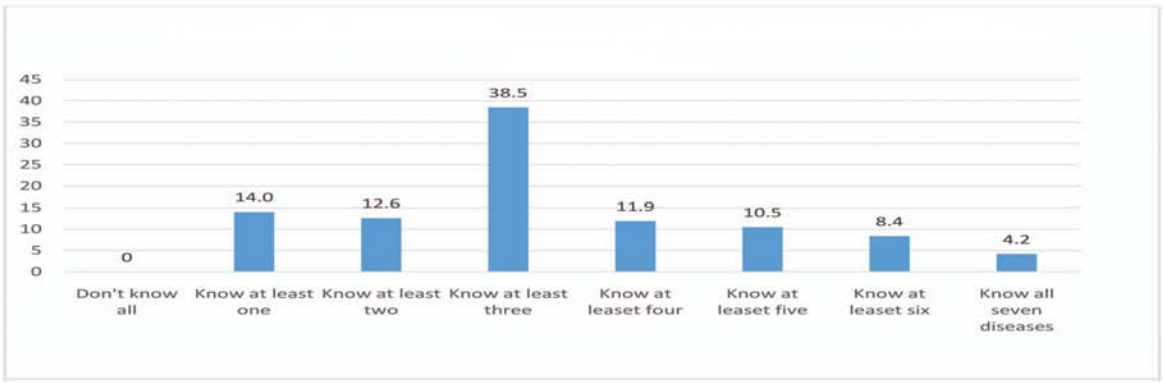


Figure 3: Possible Causes of pets Died (n=18)

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Figure 3 showed that majority of the pet owners 125 (87.41%) had no experience of pet died in their household however 18 (12.58%) had faced death incidence. Most common cause of death of pets were aging (27.77%), scabies (16.66%), food poisoning (11.11%), heart attacks (11.11%), and injury (11.11%) while 22.22% of the respondents had killed their pets due to aggressive behaviour.

Table 3: Knowledge of particular zoonotic disease as reported by respondents

	Disease specific variables	Frequency n=143	Percentage
Rabies	Knowledge about mood of transmission:		
	Yes	142	99.30
	No	1	0.7
	Knowledge about sign and symptoms:		
	Yes	132	92.30
	No	11	7.70
	Knowledge about Preventive measure:		
	Yes	130	90.90
	No	13	9.10
	Government of Nepal provide ARV free in cost		
	Yes	75	52.44
	I don't know	45	31.46
	No	23	16.08
	Possible outcome of rabies:		
	It is curable	16	11.18
	It is 100% fatal disease	102	71.46
	I don't know	25	17.48
Swine flu	Knowledge about mood of transmission		
	Yes	102	71.32
	No	41	28.76
	Knowledge about sign and symptoms		
	Yes	84	58.74
	No	59	41.25
	Knowledge about preventive measures:		
	Yes	86	60.13
	No	57	39.86
Bird flu	Knowledge about mood of transmission		
	Yes	118	82.51
	No	25	17.48
	Knowledge about sign and symptoms		
	Yes	100	69.93
	No	43	30.06
	Knowledge about preventive measures:		
	Yes	100	69.93
	No	43	30.06
Brucellosis	Knowledge about mood of transmission		
	Yes	37	25.87
	No	106	74.12
	Knowledge about sign and symptoms		
	Yes	30	20.97
	No	113	79.02
	Knowledge about preventive measures:		
	Yes	37	25.87
	No	106	74.12
Toxoplasmosis	Knowledge about mood of transmission		
	Yes	8	5.59
	No	135	94.40
	Knowledge about sign and symptoms		
	Yes	30	20.97
	No	113	79.02
	Knowledge about preventive measures:		
	Yes	37	25.87
	No	106	74.12

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Salmonellosis	Knowledge about mood of transmission		
	Yes	16	11.18
	No	127	88.81
	Knowledge about sign and symptoms		
	Yes	14	9.79
	No	129	90.20
	Knowledge about preventive measures:		
	Yes	16	11.18
	No	127	88.81
NCC	Knowledge about mood of transmission		
	Yes	52	36.36
	No	91	63.63
	Knowledge about sign and symptoms		
	Yes	48	33.56
	No	95	66.43
	Knowledge about preventive measures:		
	Yes	50	34.96
	No	93	65.03

Table no 3 shows the disease based knowledge related to various aspects of zoonotic disease.

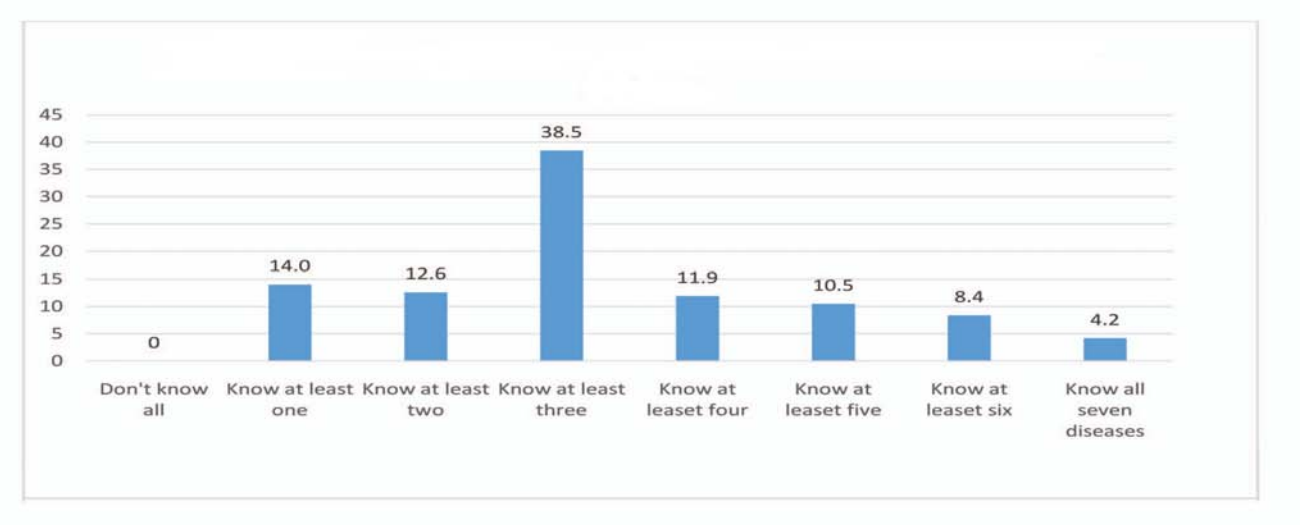


Figure 4: Knowledge about mode of transmission of zoonotinc diseases

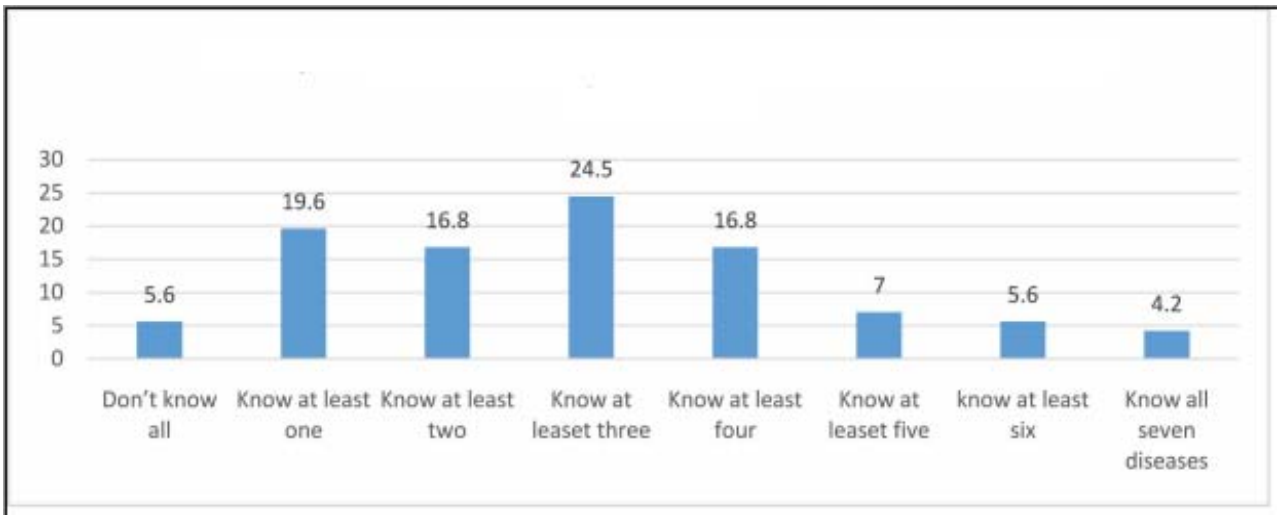


Figure 5: Knowledge about Sign/ symptoms of zoonotic diseases

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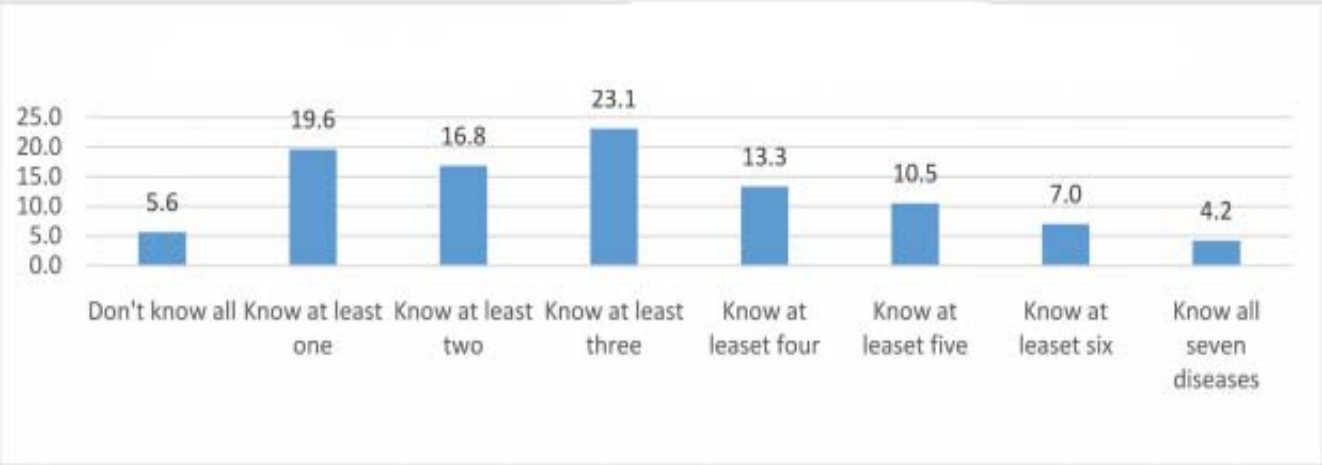


Figure 6: Knowledge about Prevention of zoonotic diseases

Figure no; 4, 5, and 6showed overall knowledge of seven pet -related zoonotic diseases in the study. While analysing knowledge about three aspects (mode of transmission, sign and symptoms, and preventive measures) 4.2% of the respondents had good knowledge fall three aspects of studied seven diseases.

Table 4: Perception of zoonotic disease and related practices among the pet owners (n=143)

Description	Fully agree		Agree		Neutral		Disagree		Fully disagree	
	Number	%	Number	%	Number	%	Number	%	Number	%
Most of the Human diseases are zoonotic:	55	38.46	63	44.0	20	13.98	4	2.79	1	0.69
Raw meat/milk consumption are high risk for zoonoses:	51	35.66	77	53.84	14	9.79	1	0.69	0	0
It is necessary to wash hand with soap water after contact the pet:	98	63.53	44	33.56	1	0.69	0	0	0	0
Vaccination is necessary for pet to prevent communicable diseases:	107	74.82	29	20.27	6	4.19	1	0.69	0	0
Dogs are the main sources of human rabies:	88	61.53	40	27.97	14	9.79	1	0.69	0	0
Touches of pet faeces with bare hands is dangerous:	89	62.23	47	32.86	4	2.79	2	1.39	1	0.69
It is high risk for zoonotic transmission if pregnant women and children are close contact with livestock:	47	32.86	78	54.54	15	10.48	2	1.39	1	0.69

Table 4 showed that overall perception towards the pet -related zoonoses. Total of 143 respondents were rating in five scales Likert with different seven statements showed that the majority of respondents perceived positively.

VI. Discussion

Pets have been the potential sources of numerous human infectious diseases. However the situation of zoonotic diseases in developing counties like Nepal is not known due to lack of proper studies. It is estimated that nearly two -third of the emerging zoonoses that are viral or vector -borne raising from birds, rodents, and pigs, will also rise from household pets (Smith & Whitfield, 2014). Several research findings have revealed that most of the pet owners have inadequate knowledge related to pet husbandry and infection control practices even in developed countries.

The majority of the respondents 49 (34%) were 30-39 years of age and only 3 (2.09%) were above 70 years who were visited in different parks in Kathmandu with their pets for recreation. Among the owners, most of them kept dogs 124 (86.7%), and 18 (12.58%) kept cats as pets. Only one (0.7%) respondent was found keeping tortoise in their household as a pet, which may represent the variety of pets species in Kathmandu. Most of the

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households in Kathmandu keep dog as a pet but proportion of families with exotic pets was very low as compared to Canada where 56% homes have at least one dog or cat and other having fish (12%), birds (5%), rabbits or hamsters (each 2%), lizards, guinea pigs, snakes, frogs, turtles or gerbils (each 1%) in their family (Stull, Peregrine, Sargeant & Weese, 2013). Similarly, in USA more than fifty percent of households own at least one pet, and the number of exotic pet business are increasing. Over 72 million dogs and nearly 82 million cats, 40,000 primates, 4 million birds, 640,000 reptiles, and 350 million tropical fish are live traded world-wide each year (Smith& Whitfield, 2014).

In Kathmandu, the purpose of pet keeping found diverse. Out of 143 respondents, 54 (37.71%) kept for security purposes, 34 (30 %) for their hobby, 33 (23%) due to children's pressure, while 13 (9.09%) were keeping pets without any specific purpose. Nepali society has a very long history of pet keeping in their households, especially cats and dogs. But religion has not significant difference with pet keeping practices in Kathmandu. People of a different religions were found keeping pets, although the majority of them were Hindus and dogs were the most preferred pets (n=124, 86.7%).

Rabies, bird flu, and swine flu were the most familiar zoonotic diseases among respondents, which represent 99.3, 84.6, and 71.32%, respectively. On the other hand brucellosis, toxoplasmosis, salmonellosis, and NCC, which are also equally important pet associated zoonoses, pet owners were found to have poor knowledge. So they were vulnerable for zoonoses and also the risk for epidemic and pandemic transmission. Smith and Whitfield (2014) also state that household pets, such as cats, dogs, turtles, ornamental fish, baby chicks, gerbils, frogs and lizards have been associated with outbreaks of zoonotic disease in USA and Canada.

Radio, television were the main sources of information about the zoonotic disease. Although health workers and school/collage curriculum also contribute a pivotal role for knowledge transmission about zoonoses. Along with increment in school enrolment rate in Nepal, incorporation of information in the academic curriculum about the zoonotic disease may contribute to enhancing knowledge about zoonotic diseases. In this study most of the respondents consult vet during pet's sickness 130 (90%) but, 13 (10%) respondents in Kathmandu still seek conservative/traditional practices, and cat owners don't provide vaccines.

Data also showed that 116 (81.11%) n=143, pet owners kept their pets in separate places inside the house while 21 (14.68%) were keeping outdoor. However, 6 (4.19%) respondents allow easy access to their bed and slept with them, which may be recent and risky practices in Nepalese societies however most of them maintain the hygiene of their pet. These type of practices were also found in Canada, where children are close contact with dogs and dogs were slept in child's bed (26%) or licked a child face (68%) sometimes or more frequently (Stull et al., 2013)which is most dangerous for zoonoses.

Out of 143 respondents, 12.38% experienced the death of a pet in their households with a variety of causes. 5 (27.77%) pets were found deceased due to aging. Food poisoning, heart attack, and injury -related death contribute equally to death (11.11 percentage). But 4 (22.22%) pets were killed by owners due to pets' aggressive behavior and 3 (26.66%) died due to disease like scabies.

110 (76.92%) respondents were feeding the same family food while 6 (4.19%) were feeding left-over food, but 27 (18.88%) respondents usually buy the readymade food from the market for their pets. Feeding practices of pets was associated with the economic status of the respondents. Stull et al. (2013) showed a similar finding is that developed countries like Canada 92.4% (n=244) owners feeding their pet commercial canned/dry food whose economic status found sound.

Another serious issue in Kathmandu is the open defecation of the pet animals (especially dog). Public defecation (park and street) practice was found among 113 (79.03%) pet owners, especially among dog owners which have raised public attention against it due to associated risk of zoonotic disease transmission. The study conducted in Denmark, which was observed at 72 puppies and kittens between 11 and 17 years of age, 29% of fecal samples from the puppies were positive for campylobacter, and many had C. Jejuni infection (O' Rourke, 2002). So the open defecation of pets is not only associated with the transmission of zoonoses but also distracts the beauties of the city.

Knowledge on different aspects of zoonoses found sound on rabies, bird flu, and swine flu. However, knowledge on brucellosis, toxoplasmosis, salmonellosis, and NCC, which are diseases equally risky by pets was found, poor respondents. Only4.2% of respondents know about the mode of transmission, sign/symptoms, and preventive measures of all seven studied diseases. However, 38.5, 24.5, and 23.1% of the respondents had knowledge on the mode of transmission, sign/symptoms, and preventive measures respectively in any three zoonotic diseases and 5.6% respondents had not any idea of sign/symptoms and preventive measures of all seven diseases. Which indicate pet owners in Kathmandu had a poor knowledge of zoonoses. Majority of the respondents 102 (71.32%) said that rabies is a 100% fatal zoonotic disease but 41 (28.68%) respondents had poor knowledge about the possible outcome of rabies and only 75 (52.44%) respondents have knowledge that ARV is freely available up to district level government hospital in Nepal.

Educational status had positive association with perception about zoonoses. There were seven positive statements related to zoonoses prevention in which 69

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to 95% of respondents were fully agreed or agreed in which 89% of respondents had secondary to higher level of education. But Smith and Whitfield (2014) mention that many pet owners in Canada often unaware of the risk of their pets, as a result, engage in husbandry and hygiene practices that increase the likelihood of acquiring diseases. However, they have sound education which found the reverse to compare with our study. This means only formal education may not be sufficient to create health –related a ware ness in the community.

Based on the study, few practices related to pet keeping were found satisfactory like consultation with veterinarian during pet sickness, place of pet keeping, and timely vaccination. However, more than two thirds (79.03%) of respondents were practicing open defecation to their pets, and sharing the same bed (4.19%) increased the susceptibility for zoonoses. Likewise, overall knowledge related to zoonoses found poor.95% of the respondents are facing zoonotic risks either due to low knowledge of the mode of transmission, or sign/ symptoms, or on preventive methods, or by harmful pet keeping practice. But despite of poor knowledge they perceived zoonotic threats, which may be due to the influence of socio – cultural practices.

VII. Conclusion

Pet contributes to human societies for physical as well as psycho-social well being; however, due to ignorance and illiteracy about zoonotic diseases associated with pets, owners are facing zoonoticrisk. In this study, respondents were found to have low knowledge basically on common zoonoses (i.e., brucellosis, salmonellosis, toxoplasmosis, NCC, etc.) and free availability of ARV in government hospital even among respondent with higher education. Improper pet handing practices like open defecation, bed sharing and inadequate knowledge on pet -related zoonoses have been identified as primary risk factors forpet owners. Formal education alone is not sufficient to provide knowledge on healthy pet keeping practice, the government should make the registry of pets and make provision to provide necessary skills and knowledge for pet owners. Further studies are necessary to determine the impact of interventions targeted to zoonotic diseases and pet keeping practice. Policy and intervention gaps should be fulfilled with the collaboration of multi-sectoral agencies like a one health concept.

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