Original Research Article

Awareness of zoonotic diseases among the Bachelor of science new entrants at the Open University of Sri Lanka in 2020

ABSTRACT

The study draws on the awareness of a group of new BSc degree registrants (N=267) about common zoonotic diseases at The Open University of Sri Lanka in 2020. A cross-sectional study was employed for the participants in a virtual orientation session in December 2020 using a structured online questionnaire. Pearson Chi-square test ($\chi 2$) with a significant value of $p<0.05$ used for data analysis. The survey evaluates from the total respondents 89.9% were aware of zoonotic diseases in humans by animals, 77.9% are aware that zoonotic diseases can be transmitted to humans by direct contact with infected animals and 75.3% knew that zoonotic diseases can be transmitted by eating raw meat of infected animals. Further, 82.4% and 86.1% of respondents agreed that zoonotic diseases can be treated and prevented while 85.4% agreed that zoonotic diseases can be controlled. The majority of the respondents were aware of Rabies, Covid 19, Malaria, Dengue fever and SARS as zoonotic diseases and a higher proportion of female respondents identified Hepatitis E as zoonotic diseases. Bovine tuberculosis was identified by students who studied biological sciences compared to other streams in their G.C.E A/ls. Respondents below 24 years of age identified Anthrax and Leptospirosis, SARS and Trichinellosis as zoonotic diseases than other age categories. When considering the demographic location, students in suburban areas had a higher tendency to identify Ebola, Giardiasis, and Hepatitis E as zoonotic diseases. Urban and suburban students had a higher tendency to wash their hands thoroughly after petting the animals. Giardiasis was the only zoonotic disease that was identified by pet owners in the respondents and agreed that avoiding direct contact with animals, avoidance of rearing pets indoors and discarding pet faeces in a proper place as good practices to avoid the transmission of zoonoses. Most of the respondents agreed that zoonotic diseases can be prevented by avoiding eating raw meat , avoid eating unwashed fresh fruits and vegetables, avoiding direct contact with animals, avoiding rearing pets indoors, regular vaccination of pets, proper discharge of animal faeces, wash the hands thoroughly after petting the animals. Overall, this study revealed that the level of awareness about zoonotic diseases among the new BSc registrants was satisfactory. It is inferred that the students could be more educated about the preventive and control measures for zoonotic diseases by conducting awareness seminars during the first year of the BSc degree programme. It is expected that students will develop essential life skills that are required for the prevention and control of diseases.

Keywords: Zoonoses, cross-sectional study, questionnaire, OUSL, BSc undergraduates, Distance learners

1. INTRODUCTION

The emergence of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) in 2019 has expanded the scientific inquiry into zoonoses. Zoonoses represent 60% of emerging infectious diseases worldwide (Taylor et al., 2001). The World Health Organization (WHO) defined zoonoses as those diseases transmitted between people and vertebrate animals (WHO, 2006). Zoonotic pathogens including, viruses, bacteria, fungi, or parasites may emerge from animal reservoirs and spread to a wider geographical range.

Zoonoses are one of the major global challenges which cause devastating effects on public health. In addition to COVID-19, recurring outbreaks of common zoonotic diseases such as severe acute respiratory syndrome (SARS), malaria, dengue, avian influenza (H5N1, H7N9), Ebola virus disease (EVD), and Nipah virus have caused millions of deaths and significant economic loss worldwide. It also impairs livestock productivity and imposes multiple burdens on the economy and society (WHO, 2006).

The recurrence of the outbreak of zoonotic diseases is mainly attributed to human activities. Unprecedented population growth, land-use modification for urbanization, agricultural change, and change in food pattern accounts for the emergence and re-emerging of zoonotic diseases (Taylor et al., 2001). Destruction of natural habitats of animals due to urbanization and climate change increases the risk of zoonotic diseases by increasing the contact between wild animals and humans. Also, climatic change influences the dynamics of the host, pathogen, and their interaction and facilitates the emergence and spread of zoonotic diseases (Rupasinghe et al, 2022). Further, culinary traditions such as the consumption of wildlife meat can contribute to infectious disease emergence (Magouras et al., 2020). Collectively these factors may favour the transmission of zoonotic diseases to humans from animals and spread very quickly as demonstrated by the ongoing coronavirus (COVID-19) infection.

Asia Pacific region has been identified as the epicentre for the emergence of zoonotic diseases such as COVID-19 and SARS in the People's Republic of China (PRC) in 2019 and 2002, respectively, Nipah virus in Malaysia in 1999 and Bangladesh in 2001 (Bordier and Roger, 2013). Recently, the Indian subcontinent has been identified as one of the four global hot spots at increased risk for the emergence of new infectious diseases (Allen et al.,2017). Sri Lanka located in the Indian subcontinent is also at elevated risk of the emergence and re-emergence of zoonoses due to its high mammal & bird diversity and their interaction with humans. Rabies, Leptospirosis, dengue, Japanese encephalitis (JE), chikungunya, (Dissanaike., 2002), and recent COVID 19 are major viral zoonoses that have been recognized by the public health services of Sri Lanka. In addition to viral zoonoses, there is a growing concern in Sri Lanka with the emergence of several parasitic zoonoses (Dissanaike., 1984).

Globally, the impacts of zoonotic diseases are primarily reduced by focusing on quarantine, vaccine, and drug development (Pike et al., 2014) at the post-infection levels. However, the devastating effect of the current pandemic emphasizes a shift from a reactionary to a preventive approach to extenuating the impacts of zoonoses. Lack of knowledge and awareness of zoonotic diseases implies the main hindrance to prevention measures. Hence, awareness of zoonoses at all levels of society is imperative to lower the risk of transmission.

The university student communities represent a unique cohort that includes young individuals in a country with ample health literacy. This group can be empowered to make appropriate lifestyle changes to reduce the transmission of zoonoses. The level of awareness of zoonoses among the university student population is crucial in understanding the knowledge gap and may imply the need for education on zoonoses at the university level. Especially the Open and distance learning universities where the student population is diverse in their age, employability, and educational status may provide a better cohort to investigate the awareness, knowledge, and attitudes toward zoonotic diseases.

The Open University of Sri Lanka (OUSL) is only the state university in Sri Lanka where students may pursue further education solely through the Open and Distance Learning (ODL) mode. It serves a large student population spread throughout the country who had limited higher education opportunities at conventional universities (Jayasinghe et al.,2018). The OUSL has six faculties and the Faculty of Natural Sciences offers the Bachelor of Science (BSc) degree programme. Every year over 1500 students spread over the country register for the BSc degree offered by the OUSL. Students who have followed their secondary education in the science stream and have fulfilled the basic entry qualification can register for the BSc degree programme. Hence, it is expected that these BSc undergraduates may have a basic understanding of zoonoses. In this light, the present cross-sectional study was conducted to evaluate the awareness, knowledge, and attitudes on common zoonotic diseases among the new registrants of the BSc degree programme at OUSL in 2020. It is anticipated that this study emphasizes the need for health education for students on common zoonotic diseases at the early stages of their degree programme.

2. METHODOLOGY

2.1 Study design, setting, and participants.

A cross-sectional study design was employed for a cohort of 692 new BSc registrants who participated in the virtual orientation program known as Empowerment For Independent Learning (EFIL) held in December 2020 at the Open University of Sri Lanka. The set of students registered for the BSc degree programme at OUSL have fulfilled their university entrance qualification with at least three minimum passes in G.C.E A/L in the science stream (Secondary education level).

2.2 Survey instrument

Data was collected using a structured and self-administered online questionnaire. The questionnaire was prepared based on information provided on the World Health Organisation (WHO), and Centers for Diseases Control (CDC) websites. It consisted of both open and closed-ended questions, and it was structured into three sections of questions that covered the 1) demographic characteristics of the respondent (age, sex, marital status, place of residence, occupation, and stream of education), 2) awareness of zoonoses and transmission, 3) knowledge on types of zoonoses (28 viral, bacterial, and parasitic zoonoses) and 4) Attitudes and practices for prevention of zoonoses. A questionnaire was prepared in English and was reviewed by the panel of experts in the Department of Zoology, OUSL. The questionnaire was modified based on their comments.

2.3 Data Collection

Data were collected by using the self-administered online questionnaire emailed to students as a google form at the end of the virtual orientation programme held in December 2020. Due to the complete lockdown of Sri Lanka due to COVID-19, pandemic questionnaires were sent only by email. Ethical approval was not obtained for the study as it was a questionnaire survey and according to the institutional requirement, informed consent was obtained. It was an anonymous survey that took about 8-10 min to complete the questionnaire. In the first part of the questionnaire, the objective of the study was explained. It was further highlighted that their participation is voluntary and confidential.

2.4 Data Analysis

The data collected were properly coded and entered into a Microsoft Excel spreadsheet, which was entered later on into SPSS version 20, SPSS Inc. Chicago. The data were divided into three sub-sections: demographics, knowledge, practices, and awareness; and descriptive analyses were performed. The independent variables were tested for significance using the Pearson chi-square test ($\chi 2$). The $p<0.05$ was selected as a significant value.

2. 5 Availability of data and materials

Data will be shared upon request by the readers.

3. RESULTS AND DISCUSSION

3.1. Demographic characteristics of participants

A total of 267 respondents participated in this study. The demographic characteristics of respondents are summarized in Table 1. Of the 267 respondent's majority were represented by female students (83.5%). Among the participants, 183 (68.5%), 64 (24.0%), 15 (5.6%), 3 (1.1%) and 2 (0.7%) students were less than 24 years, within 25 and 29 years, within 30 and 34 years, within 35 to 39 years and 40 and 49 years old, respectively. Only 26 respondents were married (9.7%) while others were single (90.3%). Eighty % (80%) of the respondents were students (unemployed) while 17.2% and 3.4% were teachers and administrative occupations, respectively. Further, 87.3% of the respondents have enrolled in biological science, 6.0% in the computer science stream 0.7% in the agriculture stream, and 0.4% in the physical science stream. Respondents were from mainly urban (38.6%), semi-urban (34.1%), and rural (27.3%) areas. Among the respondents, 56.9% were pet owners.

Since the university provides education through several regional centres and study centres all around the country there is a comparative larger student community in OUSL with a variety of demographic characteristics than in other conventional universities in Sri Lanka. The distance education mode provides students to do their studies while they are employed in different types of occupations. The open education system provides them to obtain higher education without restricting themselves to their age. These kinds of reasons give diversity to the student body with their demographic characteristics such as their hometown, occupation, age limit, marital status and gender. The female student body is comparatively higher regardless of their age, marital status and occupation than the male student body due to the convenience of committing time to education with distance education. According to the results, the majority of respondents were aware that zoonotic diseases are transmitted to humans by animals. Among the respondents students in this survey showed a satisfactory level of sense of the fact of zoonotic diseases can be transmitted to humans by direct contact with infected animals which may cause most of their awareness of those facts that zoonotic diseases can be treated, prevented and controlled.

Table 1: Demographic characteristics of respondents

Demographic variable	Category	N (%)
Age group	<24 years	183 (68.5)
	25-29 years	64 (24.0)
	30-34 years	15 (5.6)
	35-39 years	3 (1.1)
	40-49 years	2 (0.7)
Gender	Male	44 (16.5)
	Female	223 (83.5)
Marital status	Single	241 (90.3)
	Married	26 (9.7)
Occupation	Student	184 (68.9)
	Teaching	46 (17.2)
	Agricultural sector	1 (0.4)
	IT related	3 (1.1)
	Medical laboratory	1 (0.4)
	Administrative	9 (3.4)
	Finance	1 (0.4)
	Technical officer	1 (0.4)
	Other	21 (7.9)
Stream of G.C.E A/Ls	Biological sciences	233 (87.3)
	Computer science	16 (6.0)
	Agriculture	2 (0.7)
	Physical science	1 (0.4)
	Other	15 (5.6)
Demographic location	Urban	103 (38.6)
	Suburban	91 (34.1)
	Rural	73 (27.3)
Pet owners	Yes	152 (56.9)
	No	115 (43.1)

3.2 Awareness of zoonoses

A vast majority of BSc registrants (89.9%) knew that zoonotic diseases are transmitted from animals to people. Among the six facts about the general information about zoonoses were correctly acknowledged with percentages ranging between 89.9% to 75.3% by students (Table 2). However, demographic characteristics of participants such as age, gender, demographic location, educational qualification, and presence of pets at home have not influenced their general awareness of zoonoses (Table 3).

Majority of respondents were aware that zoonotic diseases are transmitted to humans by animals. Among the respondents students in this survey showed a satisfactory level of sense of the fact of zoonotic diseases can be transmitted to humans by direct contact with infected animals which may cause most of their awareness of those facts that zoonotic diseases can be treated, prevented and controlled.

It was noted that respondents in general were tuned to acknowledge that zoonotic diseases can be prevented by avoiding eating raw meat, avoiding eating unwashed fresh fruits and vegetables, avoiding direct contact with animals, avoiding rearing pets indoors, regular vaccination of pets, proper discharge of animal faeces, wash the hands thoroughly after petting the animals as preventive measures to avoid zoonoses. However, respondents seem to be less aware of rearing pets indoors.

It is interesting to notice that more than 75.3% of the respondents knew that zoonotic diseases can be transmitted by eating the raw meat of infected animals. There is a high risk in the consumption of raw meat and raw milk as it may have a high possibility of zoonotic disease transmission such as bovine tuberculosis (Deneke et al.,2022). Therefore, it is a satisfactory result to observe that the B.Sc. students are aware of this particular fact as they have a greater possibility in employed in dairy farming and agriculture in near future with the hope that they may imply their knowledge to prevent and control the zoonotic disease transmission. Generally, in Sri Lanka, the consumption of raw meat is not a deep-rooted culture that may have given traditional knowledge on food habits to the general student body in the means of the prevention of disease transmission via food. However, it is suggested to take steps to educate students, especially in science education about zoonotic disease types, and disease transmission via food in detail since food habit is one of the easiest methods for zoonotic pathogens to be transmitted.

Table 2: Awareness of students on general information about zoonoses

General information about zoonoses	Yes % (n)	No % (n)	No idea % (n)
Zoonotic diseases are transmitted from animals to people	89.9 (240)	3.4 (9)	6.7 (18)
Zoonotic diseases can be transmitted to humans by direct contact with infected animals	77.9 (208	7.1 (19)	15.0 (40)
The zoonotic disease can be transmitted by eating raw meat of infected animals	75.3 (201)	8.6 (23)	16.1 (43)
Zoonotic diseases can be treated	82.4 (220)	1.5 (4)	16.1 (43)
Zoonotic diseases can be prevented	86.1 (230)	4.5 (12)	9.4 (25)
Zoonotic diseases can be controlled	85.4 (228)	4.5 (12)	10.1 (27)

Table 3: Chi-square analysis, demonstrating the general awareness of zoonoses among participants according to their age, gender, demographic location, educational qualification and presence of pets at home

Variable	P value				
	Sex (male versus female)	Age (years)	Demographic location (urban, sub-urban versus rural)	Educational qualification	Presence of pets at home
General Information					
Zoonotic diseases are transmitted from animals to people	0.381	0.877	0.235	0.252	0.284
Zoonotic diseases can be transmitted to human by direct contact with infected animals	0.220	0.782	0.917	0.983	0.092
The zoonotic disease can be transmitted by eating raw meat of infected animals	0.288	0.174	0.975	0.301	0.652
Zoonotic disease can be treated	0.667	0.968	0.909	0.478	0.670
Zoonotic disease can be prevented	0.209	0.673	0.153	0.333	0.394
Zoonotic disease can be controlled	0.970	0.682	0.817	0.313	0.542

3.3 Knowledge

of types of zoonoses

The knowledge of the students regarding zoonotic diseases is represented by their ability to identify the diseases mentioned herein as zoonotic or not (Figure 1). The proportion of respondents who recognized diseases included in the questionnaire as zoonoses was variable. The highest-ranked diseases were Rabies (79.8%), COVID 19 (70.0%), Malaria (65.9%), Dengue fever (65.5%) and SARS (64.4%) (Figure 1). Least identified zoonoses were Listeria infection (24.0%), Toxoplasmosis (25.1%), Toxocariasis (25.1%) and Cryptosporidiosis (25.5) (Figure 1). According to the results, participants were less aware of parasitic zoonoses (Figure 1).

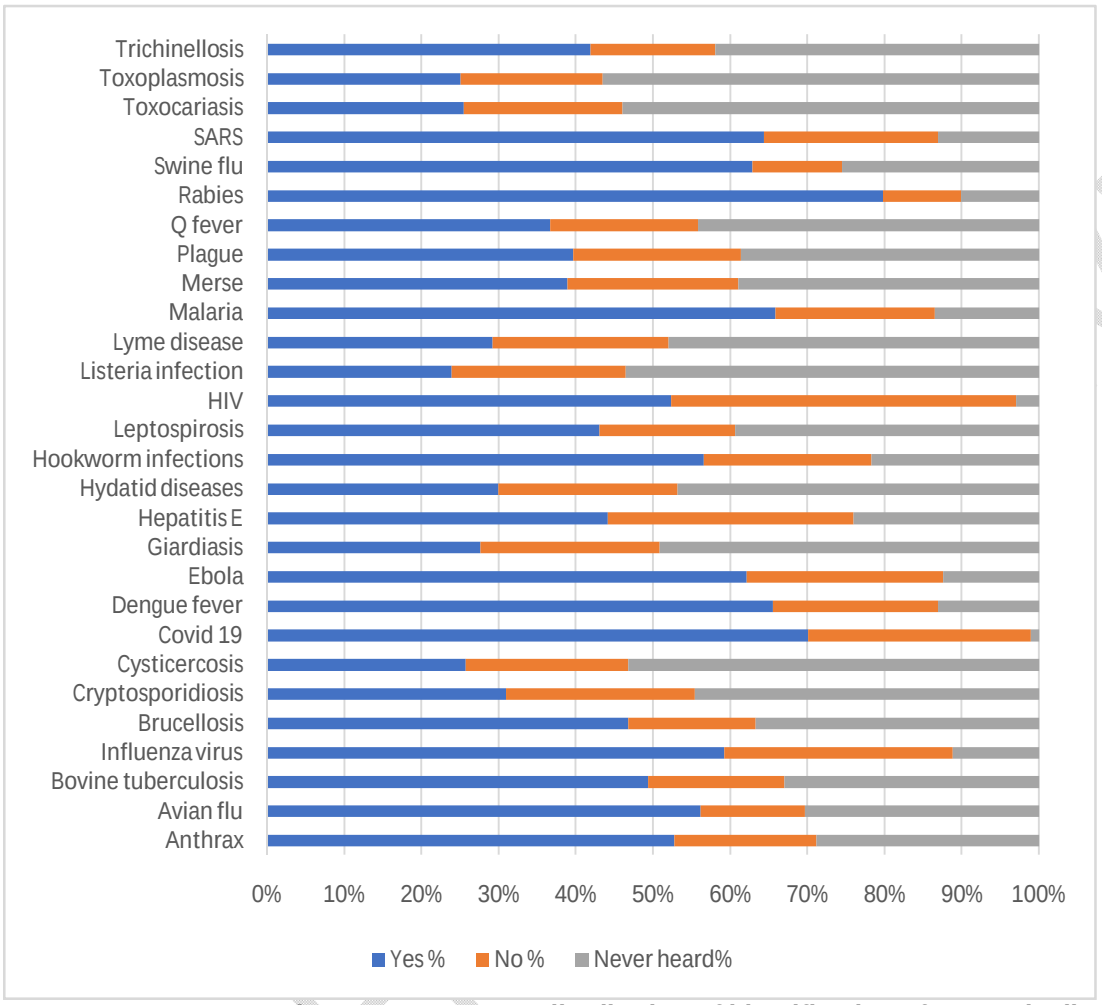

Figure 1: Frequency distribution of identification of Zoonotic diseases

Table 4: Chi-square analysis, demonstrating the knowledge of types of zoonotic diseases participants according to their age, gender, demographic location, educational qualification and presence of pets at home

Variable	P value				
	Sex (male versus female)	Age (years)	Demographic location (urban, sub-urban versus rural)	Educational Qualification	Presence of pets at home
Zoonotic diseases type					
Anthrax	0.963	**<0.05***	0.324	0.591	0.436
Avian flu	0.669	0.064	0.154	0.789	0.416

Bovine tuberculosis	0.296	0.466	0.614	**<0.05***	0.621
Influenza virus	0.093	0.605	0.811	0.837	0.120
Brucellosis	0.958	0.378	0.644	0.092	0.209
Cryptosporidiosis	0.915	0.094	0.468	0.768	0.060
Cysticercosis	0.484	0.854	0.148	0.293	0.091
Covid 19	0.708	0.627	0.672	0.862	0.205
Dengue fever	0.094	0.196	0.506	0.886	0.438
Ebola	0.571	0.936	**<0.05***	0.898	0.438
Giardiasis	0.438	0.595	**<0.05***	0.259	**<0.05***
Hepatitis E	**<0.05***	0.413	**<0.05***	0.631	0.076
Hydatid diseases	0.245	0.652	0.317	0.279	0.792
Hookworm infections	0.235	0.097	0.502	0.712	0.755
Leptospirosis	0.985	**<0.05***	0.211	0.275	0.195
HIV	0.231	0.480	0.064	0.188	0.175
Listeria infection	0.074	0.306	0.052	0.431	0.185
Lyme disease	0.203	0.283	0.066	0.489	0.197
Malaria	0.104	0.548	0.801	0.802	0.317
Merse	0.752	0.761	0.177	0.239	0.405
Plague	0.065	0.199	0.542	0.682	0.341
Q fever	0.178	0.443	0.077	0.467	0.789
Rabies	0.444	0.385	0.152	0.265	0.081
Swine flu	0.537	0.074	0.308	0.429	0.406
SARS	0.691	**<0.05***	0.244	0.053	0.929
Toxocariasis	0.634	0.318	0.189	0.195	0.134
Toxoplasmosis	0.234	0.179	0.319	0.094	0.432
Trichinellosis	0.461	**<0.05***	0.920	0.128	0.692

4. CONCLUSION

In this survey we collate the current situation of the level of awareness on zoonoses, among the distance learners who follows the Bachelor of Science degree programme. As The Open University of Sri Lanka consists of a large student population that is spread throughout the country with a variety of demographic aspects such as occupation and age, the aim of raising awareness of the general public through students will be an easy path. Further, it is warranted to extend this study to a large population of students in other universities in Sri Lanka to obtain a broad understating of their awareness. As participation in this survey among newly registered students was voluntary it may lead to some bias in responses. Therefore, it is suggested to build up the methodology for this kind of survey to collect information from all the students in a targeted group.

CONSENT

Written consent was obtained from each participant when starting the survey questionnaire as the first question. The anonymity of the information collected was assured during the survey.

ETHICAL APPROVAL

Not applicable.

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