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## PERCEPTION AND SAFETY PRACTICES TO ZONOTIC DISEASES TRANSMISSION AMONG SMALL RUMINANT FARMERS IN ONA-ARA LOCAL GOVERNMENT AREA OF OYO STATE

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### ABSTRACT

*The study examined the awareness and safety practices to zoonotic diseases transmission among small ruminant farmers in Ona-Ara local Government area of Oyo state. Random sampling was used to select 50% of the farmers association in each village to give total number of 110 respondents in the study area. Data was obtained using structured interview schedule and described statistically with Chi Square and PPMC for the hypotheses. The study revealed that most (71.8%) of the respondents were male, 77.3% were married and 54.9% fell above 51 years of age. Also, the study revealed that 48.2% of the respondents had no formal education while few (7.2%) had secondary education with 49.1% of the respondents being Christians and 47.3% Muslim. The study further showed that most (75.5%) of the respondents had low level of awareness towards zoonotic disease transmission while 24.5 % had high awareness on zoonotic diseases. Also, most (50.9%) of the respondents had unfavourable perception towards zoonotic diseases transmission while 49.1 % of them had favourable perception. Also, most (91.8%) of the respondents regularly carried out routine disease monitoring on their animals, bondage the wounds of their animals (91.8%), wash or sanitize their hands after contact with diseased animals (75.5%) and apply disinfectant (70.9%). Hypothesis of the study revealed that there was no significant relationship between socio-economic characteristics of the respondents and their use of safety practices except marital status ( $\chi^2=29.748, p=0.000$ ) and years of experience ( $r=0.342, p=0.000$ ) which were significantly related. PPMC analysis showed that there was significant relationship between the level of awareness and safety practices ( $\chi^2=0.420, p=0.000$ ). Also, there was significant relationship between respondents' perception on zoonotic disease transmission ( $r= 0.294, P=0.02$ ). It is therefore recommended that appropriate authorities should create adequate enlightenment programmes on zoonotic disease transmission through various media to ensure a balance in the level of utilization of zoonotic disease information and safety practices among farmers.*

**Keywords:** Awareness, safety practices, zoonotic diseases, small ruminant farmers

### INTRODUCTION

Zoonoses are diseases and infections that are naturally transmissible between vertebrate animals and humans (WHO 2015). They are among the most frequent and dreaded risks to which mankind are exposed. The emergence and re-emergence of zoonoses and its potentially disastrous impact on human health are a growing concern around the globe (Woolhouse, *et al.*, 2005). Zoonoses are infectious diseases of animals usually vertebrates that can naturally be transmitted to humans. Zoonoses can be caused by a range of diseases

pathogens such as viruses, bacteria, fungi and parasite, Of 1,415 pathogens known to infect humans, 61% were zoonotic (WHO, 2014).

The zoonotic diseases may be transmitted to livestock farmers through contamination during production, processing, and handling of food products of animal origin. About 68% of workforce in India is in close contact with domestic animals (Pavani, 2014) and their activities, such as working with animals and in their sheds, improper disposal of waste from animal sheds, skinning of infected

animals, slaughtering of diseased animals, disposal of infective material from the diseased animals, and poor personal hygiene practices, have been reported to be important risk factors. Lack of awareness about the occurrence of zoonotic diseases and their impact on public health have acted as a major hurdle in commencing adequate and effective control measures (Asokan *et al.*, 2011).

Most human disease originated in animals, however, only diseases that routinely involve animal to human transmission like rabies are considered as zoonotic. Zoonoses have different modes of transmission. In direct zoonoses the disease is directly transmitted from animal to humans through media such as air (influenza) or through bites and saliva. Domestication allowed the transition from a hunter-gatherer human behavior to a sedentary lifestyle. Together with settlement, and an increased defense of the territory, the cohabitation with animals led to the emergence of epidemics associated with the building up of shared parasite/pathogen communities over the course of time (Morand *et al.*, 2014). Phylogenetic studies show that domesticated animals were not just the source of pathological infections for humans but that they were also the recipients of pathogens that evolved from humans in the opposite direction. Examples are *Taenia* and *Mycobacterium bovis*, which is originated from humans' consumption of raw carnivores/scavengers prey meat followed by a transfer to the domesticated animals and though an adaptation of a *Mycobacterium tuberculosis* strain to the animal recipient, respectively (Smith *et al.*, 2009).

Zoonotic diseases have both direct and in-direct effects on livestock health and production (Smits, and Cutler, 2004). Indirect effects as a result of the risk of human disease the economic impact on livestock producers through barriers to trade, the costs associated with control programmes' the increased cost of marketing produce to ensure it is safe for human consumption and the loss of markets because of decreased consumer confidence. Zoonotic agents can also be spread from wildlife to humans indirectly by contaminated food and water, for example *Salmonella* spp. and *Leptospiras* spp.

Perception of farmers about zoonotic diseases and their prevention needs to be assessed as an understanding about awareness and practices of farmers can be a useful tool in developing and improving existing control measures (Swai and Schoonman, 2010). Domestic ruminants are the primary reservoir for human infection, and the majority of human epidemics are related to exposure to small ruminant (sheep and goats) infected products (placenta membranes, birth fluids, animal excretions or contaminated dust), (Boarbi, *et al.*, 2016). Transmission of infection from animals to humans is facilitated by the inhalation of contaminated aerosols. The infection in animals is usually sub-clinical or asymptomatic except in pregnant animals where it can cause abortion and stillbirth. Highly infected placentas can be retrieved from abortions but also from the natural parturition of infected animals (Roest *et al.*, 2012). The objective of the study is to determine the awareness and safety practices of zoonotic diseases transmission among small ruminant farmers in Ona-Ara Local Government area of Oyo State.

## MATERIALS AND METHODS

### Area of Study

This study was carried out in Ona-Ara Local Government Area in Oyo State, which was created in 1989 with the Administrative headquarters located at Akanran. It shares boundaries with Egbeda Local Government to the North, Oluyole to the West, Osun State to the East and Ogun State to the South. The Local Government Area covers a total land area of 425.544 square kilometres with a population density of 707 persons per square kilometre. Using a growth rate of 3.2% from 2006 population census, the 2010 estimated population figure for the Local Government area was projected to be 300,659 (NPC, 2006).

The residents of the Local Government Area are Yoruba's and other tribes from various part of the country. The people are of Christianity, Islamic and traditional religious background and are predominantly farmers and traders. Farming population is scattered all over the various communities of Badeku, Jago, Ojoku, Ajia, Foworogun, Idi-Ogun, Elese-Erin, Olosunde, Ojebode, Akanran, Gbada-Efon etc. Among Agricultural activities being practiced by the people

are gari processing, oil milling, poultry, piggery, fishing, sericulture to mention a few.

The population of the study was small ruminant farmers in Ona-Ara Local Government area in Oyo State. Ona-Ara local government area was purposely selected due to the high concentration of the small ruminant farmers in the area. Akanran, Kajola, Oloya villages in, due to the high concentration of the small ruminant farmers in the area. The number of small ruminant farmers was determined in each villages; Akanran 86, Kajola 72, Oloya 63. Random sampling was used to select 50% of the farmers in each village: Akanran 43, Kajola 36, Oloya 31 to give total number of 110 respondents in the study area. Primary data was collected using quantitative techniques i.e. a well-structured questionnaire. The statistical tools used for this research work are descriptive statistical tools, which include frequency table, simple percentile while the inferential statistical tool was Chi-square and Pearson Product Moment of Correlation (PPMC).

## RESULTS

Table 1 below shows that most of the respondents (71.8%) were male while 28.2% were female. This implies that more male engaged in small ruminant rearing than the female. Also, majority of the respondents (54.9%) were above fifty years of age which is an indication that majority of them were adult. Also majority of the respondents (77.3%) were married, while only 5.5% were single, 7.2% divorced and 10.0% widow and largest percentage of the respondents (48.2%) had no formal education and in terms of religious background they were having almost the same fraction of Christian and Muslim 49.1% and 47.3% respectively which is an indication that the study area were dominated by Christian and Muslim mainly.

The table 2 below revealed that most of the respondents (73.6%) were not aware that zoonoses disease exist at all, while (76.4%) were not aware that zoonoses disease are transmissible and (79.1%) of the respondents were not aware that zoonoses diseases are naturally transmissible, likewise most

of the respondents were not aware that ruminant animal can transmit zoonoses disease easily to man. Majorities of the respondents (77.3%) were not aware that zoonoses disease can be contacted if taken raw or uncooked milk. Likewise majority of the respondents (76.4%) were not aware that air borne diseases can cause zoonoses disease and also most of the respondents (77.3%) were not aware that vector borne diseases can transmit zoonoses and finally some of the respondents were fully aware that some of the food borne diseases are zoonotic while about (77.3%) were not aware that food borne diseases are zoonotic in nature.

Table 3 below reveal that the level of awareness about safety practices to zoonotic diseases transmission among small ruminant farmers in Ona-Ara Local Government of Oyo State is low with more than half of the respondents (75.5%) recorded low level while only 24.5% of the respondents had high level of awareness.

Table 4 below revealed that most of the respondents (55.5%) perceived and disagreed that interaction with ruminant animal can pose a risk for zoonoses, and 70% of the respondents perceived and disagree that many of these zoonotic diseases have been around for sometimes. Table 4 further revealed that majority of the respondents (71.8%) perceived and disagreed that most of the emerging pathogens are considered as zoonotic diseases, while most of the respondents (59.1%) perceived and disagreed that animal affected with zoonoses without precautions can live long and majority of the respondents (60%) perceived and disagreed that maintenance of optimum health in humans and animals helps to prevent zoonoses while majority of the respondents (40.9%) perceived that not all diseases are zoonotic and (43.6%) perceived that ingestion of infected animals may result in zoonoses. Table 4 further explains that most of the respondents (43.6%) perceived that not all interactions with animals can pose a risk of infection while most of the respondents (41.8%) perceived that all animals affected with zoonotic disease are incurable.

**Table 1: Socio-economic Characteristics of the Respondents**

<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Sex</b>		
Male	79	71.8
Female	31	28.2
<b>Total</b>	<b>110</b>	<b>100</b>
<b>Age</b>		
20-30	6	5.4
31-40	12	10.8
41-50	32	28.9
51 Above	60	54.9
<b>Total</b>	<b>110</b>	<b>100</b>
<b>Marital Status</b>		
Single	6	5.5
Married	85	77.3
Divorce	8	7.2
Widow	11	10.0
<b>Total</b>	<b>110</b>	<b>100</b>
<b>Religion</b>		
Christianity	54	49.1
Islam	52	47.3
Traditional	4	3.4
<b>Total</b>	<b>110</b>	<b>100</b>
<b>Level of Education</b>		
Adult Education	2	1.8
No Formal Education	53	48.2
Primary Education	28	25.5
Secondary Education	8	7.2
Tertiary Education	19	17.3
<b>Total</b>	<b>110</b>	<b>100</b>

**Table 2: Awareness on zoonoses diseases**

<b>Statements</b>	<b>Fully aware</b>	<b>Not fully aware</b>	<b>Not aware</b>
Are you aware of any safety practices to Zoonoses disease	0(0.0)	29(26.4)	81(73.6)
Do you know that Zoonoses are transmissible and infectious diseases	1(0.9)	25(22.7)	84(76.4)
Do you know Zoonoses disease and infections are naturally transmissible	0(0.0)	23(20.9)	87(79.1)
Do you know not all small ruminant animals can transmit Zoonoses infections	0(0.0)	23(20.9)	87(79.1)
Do you know that Zoonoses are transmissible diseases that are naturally transmissible between small ruminant animals and humans	0(0.0)	23(20.9)	87(79.1)
Do you know some possible Zoonoses diseases	0(0.0)	23(20.9)	87(79.1)
Do you know that Zoonoses infections disease agents includes (water air, food)	0(0.0)	25(22.7)	85(77.3)
Do you know that eating raw and uncooked meat can lead to contacting zoonotic disease	0(0.0)	25(22.7)	85(77.3)
Do you know taking raw milk of small ruminant animal can lead to contacting zoonotic disease	0(0.0)	25(22.7)	85(77.3)
Do you know that some air born diseases are caused by zoonoses	1(0.9)	25(22.7)	84(76.4)
Do you know that animal to human disease can be contacted	1(0.9)	24(21.8)	85(77.3)
Do you know that zoonotic diseases can be contacted from human to animal	1(0.9)	24(21.8)	85(77.3)
Do you know that some vector born diseases are zoonotic	1(0.9)	24(21.8)	85(77.3)
Do you know that some water borne disease outbreak are zoonotic	0(0.0)	24(21.8)	86(78.2)
Do you know that some food borne disease are zoonotic	25(22.7)		85(77.3)

**Table 3: Categorisation of respondents based on their level of awareness**

Variable	Frequency	Percentage	Mean
High	27	24.5	3.4
Low	83	75.5	
<b>Total</b>	<b>110</b>	<b>100</b>	

**Table 4: Respondents perception on zoonotic diseases**

Statement	SA	A	U	D	SD
Interaction with small ruminant animal can pose a risk for zoonoses	0(0.0)	23(20.9)	1(0.9)	61(55.5)	25(22.7)
Many zoonotic diseases have been around for hundreds of years	0(0.0)	5(4.5)	1(0.9)	77(70.0)	27(24.5)
Disease of small ruminant animals can be transferred to humans	0(0.0)	18(16.4)	0(0.0)	59(53.6)	32(29.1)
Most of the emerging pathogens are considered as zoonotic diseases	0(0.0)	3(2.7)	1(0.9)	79(71.8)	27(24.5)
Animals affected without precaution can live longer	0(0.0)	4(3.6)	14(12.7)	65(59.1)	26(23.6)
People who have close contact with animals can be at increased risk of zoonotic diseases	0(0.0)	8(7.3)	1(0.9)	71(64.5)	30(27.3)
Maintenance of optimum health in humans and animals helps to prevent zoonoses	0(0.0)	9(8.2)	1(0.9)	66(60.0)	34(30.9)
Most zoonotic diseases can be avoided with proper measure	0(0.0)	7(6.4)	1(0.9)	68(61.8)	34(30.9)
Ruminant livestock animals act as reservoirs for pathogens	0(0.0)	7(6.4)	2(1.8)	70(63.6)	31(28.2)
Zoonotic diseases affect only animals	0(0.0)	40(36.4)	2(1.8)	37(33.6)	31(28.2)
Zoonotic diseases are naturally transmissible between animals and man	0(0.0)	15(13.6)	1(0.9)	64(58.2)	30(27.3)
Small ruminant farmers are the most exposed to the risk of zoonoses	0(0.0)	11(10.0)	1(0.9)	66(60.0)	32(29.1)
Zoonotic diseases can be transmitted directly by contact with the infected animals	2(1.8)	25(22.7)	1(0.9)	56(50.1)	26(23.6)
Zoonotic diseases cannot be transmitted from animals or animals product	2(1.8)	10(9.1)	1(0.9)	67(60.9)	30(27.3)
Vectors are responsible for indirect transmission of zoonotic diseases	0(0.0)	18(16.4)	1(0.9)	60(54.5)	31(28.2)
Some of the zoonoses are food borne diseases	2(1.8)	10(9.1)	1(0.9)	68(61.8)	29(26.4)
Not all disease are zoonoses disease	2(1.8)	45(40.9)	2(1.8)	33(30.0)	28(25.5)
Ingestion of infected animals may result in zoonoses	0(0.0)	48(43.6)	2(1.8)	32(29.1)	28(25.5)
Not all interaction with animal can pose a risk of infection	4(3.6)	48(43.6)	2(1.8)	33(30.0)	23(20.9)
All animals affected with zoonotic diseases are incurable	0(0.0)	46(41.8)	2(1.8)	33(30.0)	29(26.4)

In summary table 5 below shows that about an average population of the respondents (49.1%) had favourable perception towards zoonotic diseases transmission while (50.9%) of the population which

is slightly above average had unfavourable perception towards zoonotic diseases transmission among small ruminant farmers in Ona- Ara Local Government of Oyo State.

**Table 5: Categorization of respondent based on the perception of zoonotic disease information**

Category	Frequency	Percentage	Mean
Favourably perception (Mean and above)	54	49.1	
Unfavourably perception (Below mean)	56	50.9	42.8
Total	110	100	

Table 6 below revealed that most of the respondents (91.8%) do not get their information about zoonotic disease from radio neither do they get it from Television (94.5%). In short majority of the respondents neither get their information from

newspaper nor from extension bulletin except few of the respondents (21.8%) that sometimes got their information about zoonotic diseases from friends and few neighbours.

**Table 6: Source of information on Zoonotic diseases to small ruminant farmers in Ona-LGA of Oyo State**

Source of information	Very often	Often	At time	Not use at all
Radio	1(0.9)	3(2.7)	5(4.5)	101(91.8)
Television	0(0.0)	1(0.9)	5(4.5)	104(94.5)
Newspaper	0(0.0)	1(0.9)	2(1.8)	107(97.3)
Extension bulletin	0(0.0)	1(0.9)	1(0.9)	108(98.2)
Circular letter	0(0.0)	1(0.9)	1(0.9)	108(98.2)
Farmers group	0(0.0)	1(0.9)	6(5.5)	103(93.6)
Cooperative societies	0(0.0)	1(0.9)	2(1.8)	107(97.3)
Internet	0(0.0)	1(0.9)	1(0.9)	108(98.2)
Mobile phone	0(0.0)	1(0.9)	1(0.9)	108(98.2)
Magazine	0(0.0)	1(0.9)	1(0.9)	108(98.2)
Extension agent	0(0.0)	1(0.9)	7(6.4)	102(92.7)
Friends/ neighborhood	0(0.0)	1(0.9)	24(21.8)	85(77.3)
Research institute	0(0.0)	1(0.9)	5(4.5)	104(94.5)
NGO'S(Non-governmental organization)	0(0.0)	1(0.9)	1(0.9)	108(98.2)

Table 7 below summarises it that majority of the respondents (73.6%) had low level of information about zoonotic disease transmission and its preventives measures while only small fraction of the population (26.4%) had high level of information about zoonotic disease transmission.

From table 8 below it was revealed that most of the respondents (91.8%) uses regular routine monitoring disease animals as one of the safety practices and about( 91.8%) of the respondents adopted bonding of wounds of animals as one of the safety practices while majority of the

respondents (90%) uses hand washing after handling of animal occasionally as one of the safety practices. Also it was revealed that (90%) of the respondents uses avoidance of eating of raw or uncooked occasionally as one of the safety practices while (75.5%)of the respondents uses washing and sanitizing of hands after coming in contact with infected animals is one of the safety practices and only (50%) of the respondents uses sanitizing of patient hand and legs before entering the cattle pen as one of the safety practices.

**Table 7: Categorisation of respondents based on their source of information**

Variable	Frequency	Percentage	Mean
High (Mean and above)	29	26.4	0.99
Low (Mean and above)	81	73.6	
<b>Total</b>	<b>110</b>	<b>100</b>	

**Table 8: Safety practices used by respondents**

Management practices	Regularly	Occasionally	Rarely	Not Used
Routine disease monitoring	101(91.8)	4(3.6)	1(0.9)	4(3.6)
Bondaging of wounds in animals	101(91.8)	4(3.6)	1(0.9)	4(3.6)
Hand washing after handling of animals	0(0.0)	99(90.0)	5(4.5)	6(5.5)
Application of insecticides against vectors	0(0.0)	1(0.9)	1(0.9)	18(16.4)
Avoid eating of raw or uncooked meat	0(0.0)	99(90.0)	1(0.9)	10(9.1)
Isolation or quarantine of the affected animal	0(0.0)	84(76.4)	1(0.9)	25(22.7)
Recapping of needles prior to disposal	0(0.0)	86(78.2)	1(0.9)	23(20.9)
Washing or sanitizing hands between patient contacts	83(75.5)	3(2.7)	1(0.9)	23(20.9)
Applying of disinfectant to the affected area of the infected animals	78(70.9)	10(9.1)	1(0.9)	21(19.1)
Sanitizing of the patient hand and leg before entering the cattle	26(23.6)	55(50.0)	5(4.5)	24(21.8)

**Table 9: PPMC analysis of the relationship between awareness and perception of zoonoses information**

Variable	r-value	P-value	Decision
Awareness and Safety practices	0.294	0.002	S

**Table 10: PPMC analysis of the relationship between respondents' perception of zoonoses information and their safety practices**

Variable	r-value	P-value	Decision
Perception and Safety practices	0.420	0.000	S

## DISCUSSION

Majority (77.3%) of the respondents were married, this implies that the sense of responsibility of married people is capable of being affected by the disease because they are mostly devoted and committed to their work and this enhance their mode of productivity towards meeting their family needs. Also according to the finding of the Lightowlers *et al.*, (2004) which states that most of small ruminant farmers are married and this will in a way or the other affects their commitment towards family business. The distribution of respondents

based on their age group indicate that, (5.4%) fall within the age of 20 -30 years, (10.8%) fall within the range of 31- 40 years of age, (28.9%) fall within the age of 41-50 years and (54.9%) fall above 51 years of age. This implies that majority (54.9%) of the small ruminant farmers were in their most active years as opined by Coleman *et al.*, (2002) that small ruminant were within the age range of 51 and above years of age. Distribution of respondents according to educational level revealed that about half (48.2%) of the respondents had no formal education, 25.5% had primary education, 17.3% had

tertiary education while only few (7.2%) had secondary education. This result implies that most of the respondents had little or no education at all the educational level like primary, secondary and tertiary levels. This also shows that with the level of education of the respondents they lack the basic knowledge of education. This result agrees with the report of Meinzen-Dick, (2002) which says that respondents level of education will affect their knowledge and the way they will accept new innovations and practices. Distribution of respondents according to religion revealed that 49.1% of the respondents were Christians and 47.3% were Muslim while only 3.4% were Traditional religion. Most of the respondents were Christian which implies that religion plays a significant role in the life of the respondent.

From the study it was revealed that none of the respondents were fully aware of the information on zoonotic disease. This implies that majority of the respondents were not aware of the zoonotic diseases information. Also, none of the respondents are fully aware that eating raw and uncooked meat can lead to contracting zoonotic disease and 22.76% of the respondents were not fully aware of this information and 77.3% of the respondents were not aware of the information at all. This result shows that majority of the respondents do not know about this information on zoonotic disease. More so, none of the respondents are fully aware that taking raw milk from the udder of a cow can pose a risk of contracting mastitis disease, 22.7% are not fully aware while 77.3% are not aware of this information at all.

The study also showed that majority of the respondents 75.5% had low level of awareness towards zoonotic disease transmission while 24.5 % had high awareness on zoonoses. This implies that farmers were not aware of diseases resulted from zoonoses transmission due to the fact that most of them did not have adequate information as a result of the educational level and their perception. the level of perception of the respondent towards the utilization of zoonotic information is unfavorably which mean that the level of perception is above the mean value this result show that the respondent have no perception about the utilization of zoonotic disease. The study also shows that information on zoonotic disease through the available sources was

not accessed by the majority of the farmers in the study area. This showed that 21.8% of the respondents accessed the information through their friends and neighbours, 6.4% accessed through extension agents while 5.4% through farmers' group Finally, from the study it was shown that there was significant relationship between the level of awareness and safety practices ( $P < 0.05$ ). The study also revealed that most of the respondents had low level of awareness about zoonotic disease information. In addition to the above results, as presented in table 9 it was showed that there is significant relationship between management practices of the respondents and their perception on the level of zoonotic disease information ( $r= 0.294$ ,  $P=0.05$ ). The results also revealed that safety management practice faced by the respondent on the level of utilization on zoonoses information is significantly related to the level of perception of the respondent. This means that there is a level of management practice to the level of perception of zoonoses information. The negative sign on the R-value show that there is an imbalance relationship between the level of management practice and perception of zoonoses information among the respondent.

### **CONCLUSION**

This study revealed that involvement of respondents in utilization of zoonotic information is adequately low. It can also be deduced that majority of the respondents were not engaged in any other income generating activities. The severity of the awareness faced by the respondents in Ona-LGA of Oyo state was high though this has been proved to have a direct significant impact on the level of perception of zoonotic disease information. Based on the empirical evidence from the study, it could be concluded that the level of awareness on zoonoses information have a direct relationship with the level of perception of small ruminant farmers on utilization of zoonotic disease information.

### **Recommendations**

Based on the findings of the result, the following recommendations are made:

- i. Appropriate authorities should create adequate enlightenment programme on zoonotic disease transmission through various media (seminars, workshop, television radio, newspaper). This will



ensure a balance in the level of utilization of zoonotic disease information and safety practices.

- ii. Also the small ruminant farmers should ensure that there is proper management practice in handling of their small ruminant animal disease information because communication are key components in any prevention and control strategy.
- iii. Public education and behavioural change are also important factors for successful

intervention. Implementing restrictions on anthropogenic animal movement is another important preventive measure. For vector-borne zoonoses, vector control should be an integral part of any intervention strategy.

- iv. Appropriate steps should be taken in providing the necessary source of information for the small ruminant farmers so that they will be able to have free and easy access to necessary zoonotic information.

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