Veterinary Perspectives On The Prevention And Control Of Zoonotic Diseases

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Abstract

Zoonotic diseases continue to pose a significant health issue in the world especially in places where human beings have close contact with animals and the environment, therefore forming an environment where the chances of disease spread are highly likely. This research paper explores the views of the veterinary on the prevention and control of zoonotic diseases based on primary data gathered in a sample of 50 veterinary professionals. The research design used was descriptive and the data collection was done using a structured questionnaire that covered both quantitative and qualitative information. The results indicate that veterinarians are regularly exposed to various types of zoonotic infections, of which rabies, bruce and leptospirosis are the most common. Prevention strategies including vaccination of animals, maintenance of hygiene and biosecurity, control of vectors, deworming, and awareness were highly observed. Nevertheless, the main challenges mentioned included a shortage of resources, lack of diagnostic facilities, poor levels of compliance by the populace and weak intersectoral coordination. Surveillance procedures like regular field visits, reporting of cases were monitored but communication loopholes between them and the public health departments still exist. This paper highlights the importance of veterinarians in managing the zoonotic diseases and calls on the need to enhance the collaboration of veterinarians, enhance surveillance mechanisms and increase awareness of the communities in order to successfully mitigate the threat of zoonotic diseases.

Keywords: zoonotic diseases, veterinary perspectives, prevention, surveillance, One Health, biosecurity, public health.

1. Introduction

Zoonotic diseases are one of the most adamant and the major health threats to global health because they can impact on both people and animals. These diseases are a result of complicated biological, ecological and social interactions and this is why their prevention and control is one of the greatest challenges of the modern health systems. According to Chen, the intersection of human, animal, and environmental health frequently results in pandemics, which makes more comprehensive perception of zoonotic risks more suitable (Chen et al., 2022). The opportunities of the spillover of pathogen have increased the increase in the density of human population, international mobility, and expansion in the habitat of wildlife, leading to increased occurrences of emerging infectious diseases.

The appearance of new pathogens is directly connected with the ecological disturbance. Allen showed that global hotspots of zoonotic outbreak are often linked to a loss of biodiversity, land-use alteration, and wildlife commerce (Allen et al., 2017). These hotspots are the areas where the occurrence of spillover is more probable since human-animal contacts are higher. Assefa also stressed that the health systems in the world are still under-equipped to face such unpredictable circumstances, which were pointed out during the recent pandemics (Assefa et al., 2021). Unnoticed pathogens still remain concerning as well; Gharban et al. referred to Coxiella burnetti as a zoonotic bacterium with a global spread, yet the modern surveillance systems do not adequately cover all components . It is necessary to understand the ecological interactions of the interactions between wild life and pathogens to forecast the future outbreaks of zoonotic disease. Júnior pointed out that bats, specifically, are significant sources of viruses and can host a variety of various pathogens with a zoonotic potential (Júnior et al., 2021). This implicates more general biodiversity/disease interactions in which the evolutionary processes can enhance the viability of viruses. In the mean time, Saadene depicted how climatic and ecological factors influence the manifestation of zoonoses that are transmitted by vectors, including cutaneous leishmaniasis, which shows that disease patterns are prone to the influence of environmental change (Saadene et al., 2023). These changing relationships demonstrate the fact that the zoonotic risks cannot be isolated in terms of the environmental and ecosystem stability.

The distribution of zoonotic diseases is largely influenced by the changes that occur to the environment. Wu noted that both socioeconomic and environmental factors contribute greatly to the spread of infectious diseases, especially where there is instability in the climatic conditions (Wu, 2021). One of the most climate-sensitive is the category of zoonoses spread by vectors; de Carvalho estimated that global warming will stimulate the growth of the spread of mosquito and tick-borne diseases in areas of the world such as Brazil, which will complicate the control of the disease (de Carvalho et al., 2020). Carroll explained the necessity to learn more about unknown viruses by stating that the world should map viromes to predict the future occurrence of spillover events (Carroll et al., 2018). Simultaneously, Peghin cautioned that inappropriate antimicrobial stewardship in case of a health crisis may aggravate the disease outcomes and make zoonotic

monitoring more complicated (Peghin et al., 2022). An increase in human intrusion into the natural ecosystems is changing the trends of zoonotic transmission. Gibb proved that in human-dominated landscapes, there is a tendency to increase the zoonotic host diversity, which offers more possibilities to spill over the pathogen (Gibb et al., 2020). This ecological transition implies that it is not the wildlife that causes the zoonotics, but rather human activities. With the growing human population moving into unexploited habitats, human-livestock and wildlife interface is becoming increasingly permeable, and disease risks are increasing.

Zoonotic threats are becoming more and more complex, which requires comprehensive solutions to disease prevention. Ellwanger indicated that the control of zoonotic diseases needs a One Health approach, which combines the strategies of human, animal, and environmental health (Ellwanger et al., 2021). This combined system is particularly applicable with the new pathogens that have threatened the conventional means of disease control. El Zowalaty emphasized that recent pandemics prove the necessity of coordinated responses based on One Health in particular situations when the previously unfamiliar viruses enter human communities (El Zowalaty and Järhult, 2020). Lane also highlighted that the integration strategy in developing nations builds the resilience of livestock health against the outbreak of zoonotic infections and zoonoses . Lu added to the importance of enhancing the preparedness of the population to health and stated that the risks of pandemics are growing with the tightening of global connections (Lu et al., 2021).

Veterinarians are the key players in reducing the risks of zoonosis. Veterinary workers are on the front line of detection of diseases, management of animals, and awareness to the community. Their points of uniqueness allow them to recognize outbreaks early and introduce control measures timely. Since zoonotic diseases are increasingly being observed due to the complex ecological and environmental conditions, veterinary surveillance is all the more important. Veterinary experience in the field of the public health system empowers early warning abilities and helps to perform the proactive work with disease reduction.

2. Materials and Methods

2.1 Study Design

This research took the descriptive primary research design to address the issue of veterinary opinions concerning zoonotic disease prevention and control. The design allowed collecting primary data through the first-hand information of the professionals working directly with animals in the field of animal health management. The study tried to record practical information, field level realities and detailed descriptions of preventive and control practices by emphasizing on direct experiences as opposed to secondary interpretations. The method produced abundant context-specific information that is vital in comprehending the recognition and management of zoonotic threat in the everyday veterinary practice.

2.2 Study Population

The population size was 1,383 veterinary workers directly involved in the services of animal health that may be clinical veterinarians, livestock inspectors, field officers, and animal health assistants. The reason why these people were chosen is due to their regular participation in the diagnosis, control, and prevention of zoonotic disease. They are at the centre of the detection and intervention of zoonotic disease due to their frequent contact with livestock and domesticated and friendly animals. The research involved 50 respondents, which is a wide and large enough sample to guarantee the meaningful and reliable data.

2.3 Sampling Technique

Purposive sampling method was used to make sure that only persons that would have pertinent knowledge and practical experience were considered. This strategy enabled the investigator to concentrate on respondents directly engaged in disease surveillance, treatment and prevention veterinary activities. The study was able to gather information that was detailed and based on experience because the people selected were not randomly selected but were chosen because of their professional background. The approach guaranteed that the data indicated actual veterinary issues and interventions as regards to zoonotic diseases.

2.4 Data Collection Tools

The collection of the data was done through a structured questionnaire that was tailored to collect both the quantitative and qualitative data. The tool was made of closed ended questions that were meant to capture aspects that can be measured like frequency of encounters with zoonotic diseases, regular preventive practices and challenges that are common. To enable the participants to tell their stories, perspectives, and recommendations using their own words, open-ended questions were incorporated. The questionnaire covered major areas of knowledge of zoonotic pathogens, bio security practices, vaccination schedules, and organization in collaboration with public health departments. It was made plain, easy to understand and interpret to facilitate proper and full answers.

2.5 Data Collection Procedure

The participants were contacted either in person or via digital communication channels, where it was convenient and possible. The goals of the study were clearly stated, and informed consent was used to participate in the study. The respondents had sufficient time to answer the questionnaire on their own to make sure that they were giving their own responses that were based on their personal experience in their profession. The completed questionnaires were revised to

ensure completeness and clarity and put under a review to be analysed. This cautious and conscientious strategy made the gathered primary data reliable.

2.6 Data Organization

All the responses, after collection, were well organised in a tabular format to facilitate working with them and comparison. All the data of each participant was contained in a row whereas each item in the questionnaire had its own column. This hierarchal design enabled response to be easily grouped and classified into variables like disease type, preventative practice and field challenges encountered. Patterns, similarities, and other significant trends in the dataset were determined using sorting and filtering methods. The labels used were kept the same and the terminology used was the same to make the work accurate and coherent.

2.7 Data Analysis

Both numerical and narrative data were interpreted using a descriptive analytical method. Counts, percentages, and averages were used to summarize quantitative responses, which assisted in determining the prevalent zoonotic diseases, most popular preventive practices, and popular challenges to operations. Tables and simple charts were drawn to have visual images to illustrate the results in a clear and understandable way. The open-ended items were analyzed as qualitative responses that were carefully reviewed to find common themes regarding the issue of surveillance, biosecurity restrictions, resource limitations, and veterinary duties. This synthesized analysis has given an overall view of how veterinary is currently participating in the prevention and control of zoonotic diseases.

2.8 Ethical Considerations

The research followed the principles of ethical principles of primary data collection. The involvement was completely voluntary and the respondents were assured that they could pull out at any time and was not obliged to do so. No personal identifiers were registered and the anonymity and confidentiality were guaranteed. All data were utilized with the purpose of academic and research only, and the findings represented without reference to particular responses of a particular person. Throughout the research process, there was accuracy, honesty and respect of professional contributions made by the participants.

3. Results

3.1 Characteristics of the Study Participants

The researchers used 50 veterinary professionals as the sample, which is a wide representation of the jobs in the veterinary healthcare field. It is worth noting that through the presentation of the numerical summary it is important to highlight that the participants represented a wide variety of working conditions, such as clinical setting, field units, and livestock inspection services. Such diversity not only diversified the data, but made sure that the findings were based on the field experiences. In order to have a better insight into the distribution of respondents in various professional categories, Table 1 summarizes the profile of the participants.

Table 1. Profile of Study Participants (N = 50)

Category	Number of Participants	Percentage (%)
Clinical Veterinarians	18	36
Field Veterinary Officers	12	24
Livestock Inspectors	10	20
Animal Health Assistants	10	20

Table 1 indicates that the majority of the respondents were clinical veterinarians, then the field veterinary officers. This distribution shows that a significant percentage of the respondents had direct experience of the clinical diagnosis and disease management services, which puts them in a good capacity to give informed opinions about zoonotic disease prevention and control.

3.2 Commonly Encountered Zoonotic Diseases

The participants were requested to name the common zoonotic diseases they experience in practice. Prior to the presentation of the tabulated data, it is worth mentioning that various diseases were also referred to repeatedly by various respondents, which means that they are widespread in various situations in the veterinary practice. The precise distribution of all the frequently reported zoonotic diseases is seen in Table 2.

Table 2. Most Frequently Reported Zoonotic Diseases

Zoonotic Disease	Number of Respondents Reporting	Percentage (%)
Rabies	45	90
Brucellosis	34	68
Leptospirosis	29	58
Avian Influenza	22	44
Dermatophytosis	12	24

Parasitic Zoonoses	10	20

Table 2 indicates that the most commonly experienced disease was rabies, then brucellosis, and leptospirosis. This evidence indicates the unabated preeminence of both viral and bacterial zoonoses on veterinary practice. A graphical distribution is suggested in order to see these disease trends and represented as Figure 1.

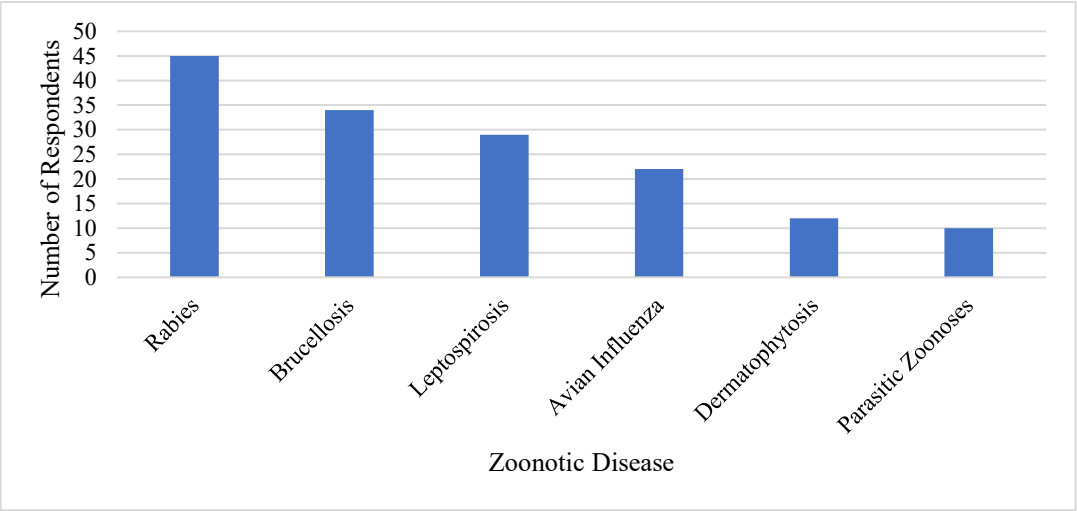

Figure 1. Distribution of Common Zoonotic Diseases Reported by Participants

Figure 1 shows that rabies had the most cases reported, which highlights the importance of its relevance as a major zoonotic threat. The visual trend shows that there is a distinct disparity between the most common and less common diseases which supports the necessity of preventive measures.

3.3 Preventive Measures Practiced by Veterinary Professionals

Prior to the presentation of the numerical results, it is important to mention that participants said that they participated in several preventive measures at the same time, which indicates a complex approach to disease prevention. The most popular interventions were aimed at vaccination, hygiene maintenance and control of vectors. Table 3 summarizes the distribution of the preventive practices.

Table 3. Preventive Measures Implemented by Respondents

Preventive Measure	Number of Respondents Supporting	Percentage (%)
Animal Vaccination	48	96
Hygiene and Biosecurity Maintenance	42	84
Vector Control Activities	35	70
Routine Deworming	31	62
Awareness Programs	27	54
Quarantine and Movement Control	18	36

As shown in Table 3, vaccination is the most commonly practiced preventive intervention with hygiene and biosecurity practices coming second. In order to better graphically depict the distribution of these practices, Figure 2 is advised as a graphic supplement.

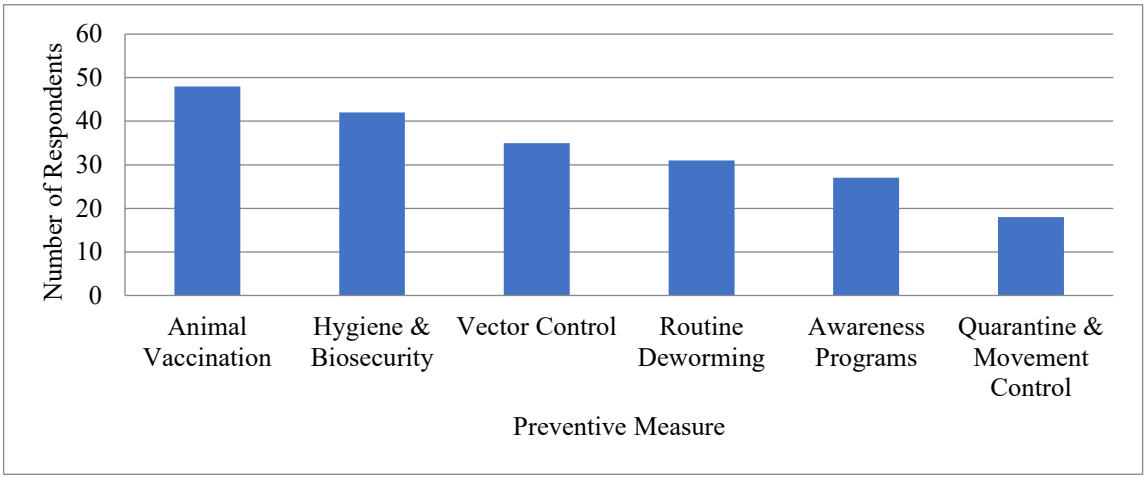

Figure 2. Major Preventive Practices Reported

The graphic illustration in Figure 2 shows the differences in the preventive measures used by veterinarians, some of the measures (e.g. vaccination) being much more salient than the others. This visualization also allows making the observation that preventive measures are still disproportionate based on the availability of resources and type of disease.

3.4 Challenges Faced in Zoonotic Disease Control

They were required to name some of the obstacles that inhibit the efficient management of zoonotic diseases. Prior to stating the table, it is noteworthy that several troubles were being raised up frequently by the identical respondent, a demonstration of systemic and operational problems going hand in hand. Table 4 gives out the distribution of the challenges.

Table 4. Major Challenges Identified by Participants

Reported Challenge	Number of Respondents	Percentage (%)
Shortage of Vaccines/Resources	38	76
Poor Public Compliance	33	66
Limited Diagnostic Access	30	60
Delayed Disease Reporting	28	56
Insufficient Awareness Among Farmers	25	50
Lack of Intersectoral Coordination	18	36

Most of the challenges that were reported included resource limitations and non-compliance by the population as shown in Table 4. Such results indicate that infrastructural and behavioral barriers play major roles in the control measures of zoonotic diseases. The table gives a concise picture of the size of such problems.

3.5 Surveillance and Reporting Practices

Prior to showing the data, it is vital to indicate that the practices of surveillance and reporting were different among the participants and showed the difference in the institutional policies, workload, and reporting systems. Table 5 displays a numerical summary of these practices.

Table 5. Surveillance and Reporting Activities

Surveillance Activity	Number of Respondents	Percentage (%)
Routine Field Visits	40	80
Regular Reporting of Cases	32	64
Scheduled Farm Inspections	28	56
Coordinated Reporting with Health Departments	21	42

As it can be seen in Table 5, the most frequent surveillance type is a routine field visit and the second type is a report of a suspected zoonotic case. Nevertheless, the comparatively lower percentage of coordinated reporting activities implies that the intersectoral communication is still weak and it needs to be reinforced. The general results indicate that veterinary practitioners come into contact with diverse types of zoonotic diseases regularly and take proactive measures to prevent these diseases, which include vaccination, biosecurity, and controlling vectors. These findings substantiate the major role of veterinarians in the prevention of zoonotic diseases and the need to ensure the further development of the infrastructure, the increase of awareness campaigns, and the enhancement of the cooperation between the veterinary and the public health sectors.

4. Discussion

The results of the given work reveal the high level of activity of veterinary workers in the control of zoonotic processes and the great variety of preventive procedures used in the field. These findings are consistent with more general patterns in veterinary public health, in which zoonotic disease prevention is a fundamental objective in varied geographical locations. As an example, Al-Hammadi pointed out that the control of such transboundary diseases as foot and mouth disease should be based on the constant veterinary attention, the effective surveillance, and the current diagnostic means . This is indicative of the need to be prepared of the veterinarians, a theme well heard in the current study where veterinarians were found to face numerous zoonotic threats that needed constant surveillance and treatment.

The findings also demonstrated that veterinarians noted mounting difficulties in the area of environmental and human practices that intensify risk of zoonotic diseases. This is in accordance with the evaluation conducted by Tazerji et al., who highlighted that the appearance and re-appearance of zoonotic disease have been greatly expedited by anthropogenic activities like the exploitation of wildlife, deforestation, and land-use change, and interferences with the natural habitats (Tazerji et al., 2022). These larger international observations are supplemented by the findings of this study that determined operational difficulties like the non-adherence of the populace and environmental risk issues and emphasizes the interplay between human behaviors and the health conditions of animals.

The mentioned preventive efforts, such as vaccination, biosecurity, and surveillance efforts are important to note the active participation of veterinarians in securing the human population against the threat of zoonotic infections. Lipton and colleagues discovered that veterinarians have an important role of prevention and they tend to be the first line of defense as they identify the early signs of clinical cases, give education to the populace and apply the direct control measures (Lipton et al., 2008). These results are in tune with the results of the present study, which show high percentages of engagement in preventive measures especially vaccination and hygiene management.

Veterinarians in this study who used both conventional and community-based methods of prevention reported the same. It is in line with the findings of Shin and Park who argued that veterinary medicine is increasingly incorporating both conventional and phytochemical approaches to the treatment of microbial and zoonotic infections (Shin and Park, 2018). In their work, it is proposed that advancing treatment approaches, along with preventive strategies, highlighted in this paper, constitute the complementary approach to zoonoses management in various environments.

The findings were also in favor of a robust One Health orientation with veterinarians reporting a strong involvement in surveillance, reporting and cross sector involvement. Dhama and colleagues stated that One Health approach is an essential principle of the connection between the ecosystems, animals, and humans by using the same strategies to control zoonotic diseases (Dhama et al., 2013). The involvement of veterinarians reported in this study supports the notion that interdisciplinary approaches that prove useful in the prevention of zoonosis are coordinated. They are in the front line, which gives them prompt detection, response, and constant communication with the public health authorities.

Results of this research showed that closer collaboration between the medical and veterinary sectors should be considered, particularly in the fields where reporting is delayed and where communication is lacking to allow fast response. Abdulrazaq and others focused on the fact that the coordinated efforts of veterinary and medical professionals contribute greatly to the efficiency of zoonotic diseases control . This is in line with the issues brought up by the participants based on disjointed reporting systems and the necessity to have more comprehensive disease control systems.

The lack of coordination between sectors was seen by the respondents of this study as a common problem, and it is a limitation that has been traditionally covered in more general literature. According to Shanko and others, the traditional veterinarians, as well as the physicians, should be in the same league in the early diagnosis, outbreak investigation and disease education in a bid to address the zoonoses (Shanko et al., 2015). The results herein, particularly in the delayed reporting and information flow are that most of these issues are still there and require specific intervention in communication between sectors.

The results of this study can play a significant role in the ethical and policy-based approaches to the control of zoonotic diseases. Van Herten and Bovenkerk stated that the precautionary principle is necessary in uncertain or emerging zoonotic risks, especially during the initial phases of these threats when there might be a lack of scientific knowledge (Van Herten and Bovenkerk, 2021). The fact that the participants place stress on the lack of diagnostics and the necessity of the improved resources confirms the need to implement precaution-based policies, which presuppose the fact that precaution measures must be adopted before the outbreaks deteriorate.

In general, the discussion demonstrates that the findings of the study are well connected with the general knowledge about zoonotic disease prevention among scholars. The problems as reported by veterinarians, resource disparities, inadequate diagnostics, disciplinary awareness, and a lack of intersectoral coordination are reflections of the world experiences recorded in modern literature. This great focus on vaccination, biosecurity and regular surveillance also demonstrates the critical importance of the veterinarians in the society in the aspect of ensuring the security of the people health wise. The reinforcement of the systems of collaboration, expansion of diagnostic power, and compliance with precautionary principles are important measures to facilitate the successful management of zoonotic diseases.

5. Conclusion

This paper has shown that veterinary practitioners are crucial and indispensable in prevention and management of zoonotic diseases. Their direct participation in the diagnosis, surveillance and vaccination programs as well as health management at farm level makes them the centre of early detection and response actions. The results show that veterinarians regularly deal with various zoonotic infections and take various preventive steps such as vaccination, hygiene and biosecurity practices, vectors control and public education. All these interventions will help to minimize the spread of diseases and

safeguard animal and human health. In spite of these strengths, the study also found that there are a number of unresolved issues and problems which restrict the effective management of zoonotic diseases. The main obstacles are lack of resources, diagnosing capacity, and lack of cooperation of people, and the lack of intersectoral communication. The best way to address the issues is by increasing institutional support, better training opportunities, and better reporting systems. Another critical finding of the results is the significant role of a detailed One Health approach with its focus on the cooperation of the veterinary, medical, and environmental spheres. In general, the paper highlights that there is a necessity of a long-term investment in veterinary services, consolidated surveillance programs, and community relationships to enhance zoonotic disease prevention. Provision of proper tools and co-ordinated support to veterinarians is important in the attainment of long term resilience in the health of the people.

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