

THE ROLE OF VETERINARIANS IN ONE HEALTH PREPAREDNESS: STRENGTHENING SURVEILLANCE AND RESPONSE FOR EMERGING INFECTIOUS DISEASES

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REVIEW

Abstract

The concept of global health security has gained popularity in recent years, especially in light of rising infectious illnesses and the COVID-19 pandemic. This study investigates the multiple character of global health security, emphasising the need for a holistic approach that brings together many areas such as public health, veterinary medicine, and environmental research. The One Health framework emerges as a fundamental paradigm, promoting interdisciplinary collaboration to effectively manage zoonotic illnesses and improve preparedness and response strategies. Institutional barriers, communication gaps, and resource constraints are major challenges in implementing this integrated strategy, preventing veterinarians and other health professionals from participating fully. The paper also explores the importance of global health diplomacy in adjusting interventions to local settings, hence increasing the acceptance and effectiveness of health programs. Finally, the findings highlight the importance of a coordinated global response to health risks, recognising that health-care system security is inextricably related to the well-being of communities around the world.

Keywords: One Health, Emerging Infectious Diseases, Veterinary Surveillance

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INTRODUCTION

The One Health concept embodies a comprehensive approach to health that acknowledges the interrelation of human, animal, and environmental health. This paradigm has garnered considerable attention in recent years, especially due to the rising incidence of zoonotic emerging infectious diseases (EIDs) and the pressing necessity for unified global health security initiatives. A collaborative, interdisciplinary approach that integrates knowledge and practices from various sectors, including public health, veterinary medicine, and environmental science, is necessary to effectively address health issues, as the One Health framework emphasises (Destoumieux-Garzón et al., 2018; Kariotis et al., 2022; Couto & Brandespim, 2020). The increase in zoonotic emerging infectious diseases, like COVID-19, Ebola, and Zika virus, has highlighted the essential significance of the One Health strategy. Approximately 60% of infectious diseases in humans are of zoonotic origin, and around

75% of new infectious diseases are likewise zoonotic (Horefti, 2023; Shaheen, 2022). This concerning trend requires a transformation in health system operations, transitioning from isolated practices to a more cohesive model that recognises the intricate interconnections among human, animal, and environmental health (Sleeman et al., 2017; Ryu et al., 2017).

The One Health strategy attempts to prevent and control zoonotic diseases while addressing broader health determinants, including socio-economic variables and environmental changes (Înci et al., 2018; Couto & Brandespim, 2020; Stenvinkel, 2020). The necessity for synchronised vigilance against zoonotic emerging infectious diseases is heightened by globalisation, climate change, and augmented human-animal interactions. The aforementioned elements facilitate the establishment and dissemination of infectious diseases, necessitating health systems to embrace a One Health approach (Sleeman et al., 2017; Couto & Brandespim, 2020; Cleaveland et al., 2017).

Environmental degradation and climate change might modify wildlife habitats, resulting in heightened interactions between

humans and potential zoonotic reservoirs (İnci et al., 2018; Couto & Brandespim, 2020; Gheorghe-Irimia, 2023, Şonea, 2023a, Şonea, 2023b, Tudor, 2023). This dynamic highlights the imperative of incorporating environmental health factors into public health policies to reduce the risks linked to zoonotic infections (Horefti, 2023; Stenvinkel, 2020). Furthermore, the One Health structure promotes interdisciplinary collaboration, which is crucial for efficient disease surveillance and response. One Health initiatives can improve the ability to detect and respond to zoonotic disease outbreaks by cultivating partnerships among diverse stakeholders, including governments, non-governmental organisations, and local communities (Vesterinen et al., 2019; Couto & Brandespim, 2020; Tidman et al., 2022). The partnership among the World Health Organisation (WHO), the Food and Agriculture Organisation (FAO), and the World Organisation for Animal Health (OIE) has been crucial in advancing the One Health strategy worldwide (Kariotis et al., 2022; Pitt, 2024). This tripartite collaboration demonstrates that integrated efforts can yield more effective health interventions and enhance results for both human and animal populations (Kariotis et al., 2022; Couto & Brandespim, 2020).

Education and training are essential elements of the One Health framework. As the concept develops, there is an increasing acknowledgement of the necessity to integrate One Health principles into the educational curricula for health professionals (Xie et al., 2017; Rabinowitz et al., 2017). By imparting knowledge and skills regarding the interrelations among human, animal, and environmental health to future healthcare providers, we can cultivate a new generation of practitioners adept at tackling the intricate health challenges of the 21st century (Xie et al., 2017; Rabinowitz et al., 2017). This educational transition is essential for fostering interdisciplinary collaboration and improving the overall efficacy of health interventions (Barrett et al., 2010; Ryu et al., 2017). The One Health strategy, with education, underscores the significance of community involvement in tackling zoonotic illnesses. Local communities frequently serve a vital function in illness prevention and management, as they contain significant knowledge regarding their ecosystems and health behaviours (Hassan et al., 2017; Cleaveland et al., 2017). Involving

communities in One Health initiatives can enhance trust and promote collaboration between health authorities and the populations they serve, ultimately resulting in more effective health interventions (Cleaveland et al., 2017; Horefti, 2023). This participative method is especially crucial in low- and middle-income countries, where resources may be constrained, and community engagement is vital for achieving favourable health outcomes (Cleaveland et al., 2017; Horefti, 2023, Couto & Brandespim, 2020; Tidman et al., 2022).

Considering the aforementioned, this paper aims to examine the crucial role of veterinarians in One Health readiness, specifically regarding the surveillance and response to emerging infectious diseases (EIDs).

THE ROLE OF VETERINARIANS IN THE ONE HEALTH PREPAREDNESS

Early detection and surveillance

Veterinarians have an important role in the early detection and surveillance of zoonotic infections, which is critical for avoiding human spillover incidents. Identifying zoonotic infections in animals before they infect people is critical for minimising epidemics. According to Rodríguez-Prieto et al. (2014), veterinarians play an important role in monitoring animal populations for new infectious illnesses. Using both passive and active surveillance methods, veterinarians can detect pathogens early, as demonstrated by the successful detection of SARS-CoV-2 in mink populations in the Netherlands, where active surveillance identified infected farms before clinical signs appeared (Santman-Berends, 2024). This proactive strategy protects animal health while also lowering the potential of zoonotic transmission to humans. The incorporation of veterinarian data into One Health surveillance systems improves the overall effectiveness of disease monitoring. Veterinarians collaborate with public health officials and ecologists to better understand zoonotic disease epidemiology (Rodríguez-Prieto et al., 2014).

Establishing One Health networks with veterinarians, epidemiologists, and wildlife experts is crucial for enhancing early warning systems and coordinating response to future outbreaks (Rodríguez-Prieto et al., 2014). A thorough assessment of monitoring systems emphasises the necessity for interdisciplinary

collaboration to detect exotic and re-emerging illnesses in animal populations, preserving public health (Rodríguez-Prieto et al., 2014). Veterinary engagement in early warning systems has been successful in a number of global efforts. The Vietnam Initiative on Zoonotic Infections (VIZIONS) emphasises the necessity of early detection of zoonotic infections, especially those with the potential to infect humans (Rabaa et al., 2015). This initiative demonstrates how veterinarians may lead initiatives to monitor animal health and discover infections that pose a risk to human populations. Furthermore, improved diagnostic techniques, such as multiplex PCR assays, enable the simultaneous detection of numerous zoonotic infections in livestock, increasing the ability for early detection (Modise et al., 2023).

Disease Control and Risk Reduction

Implementing biosecurity controls in livestock and wildlife is another crucial area where veterinarians may help with One Health planning. Veterinarians contribute to public health by developing strategies to reduce the danger of pathogen transmission between animals and humans. For example, biosecurity measures on swine farms have been demonstrated to lower the probability of influenza virus transmission between farm personnel and pigs (Moraes et al., 2023). Veterinarians advise for preventing zoonotic illnesses through appropriate cleanliness, regulated access to animal housing, and the use of personal protective equipment (PPE) (Jones et al., 2023; Verkola et al., 2021). Vaccination programs and antimicrobial management in animal populations are both critical components of disease prevention. Veterinarians are in charge of developing vaccination procedures that protect both animal and human health by limiting the spread of zoonotic illnesses (Moraes et al., 2023). For example, vaccinating animals against viruses like *Brucella* and *Leptospira* is critical to reducing zoonotic transmission to people (Modise et al., 2023). Furthermore, veterinarians play an important role in promoting responsible antibiotic use in veterinary medicine, which is required to battle the growing threat of antimicrobial resistance (AMR) ("Zoonoses and AMR: Silent Spreader of Superbug Pandemic", 2023). Veterinarians work to prevent the emergence

of resistant diseases that can harm both animals and humans by educating farmers and pet owners about the dangers of antibiotic misuse.

Veterinarians use community engagement and education to mitigate zoonotic hazards. By promoting understanding about zoonotic illnesses and their transmission pathways, they empower communities to take preventive actions (Moraes et al., 2023). For example, educational campaigns aimed at pet owners can educate them on the significance of regular veterinary check-ups and preventive care, which can greatly lower the incidence of zoonotic illnesses (Day, 2011). Furthermore, veterinarians frequently work with public health officials to perform outreach programs that teach people the value of cleanliness and biosecurity policies in reducing zoonotic disease transmission (Gado et al., 2023).

Response to Emerging Infectious Disease

In the event of an outbreak, veterinarians play a critical role in the investigation and control of developing infectious illnesses. Their knowledge of animal health enables them to accurately identify the source of epidemics and efficiently conduct control measures. For example, during avian influenza outbreaks, veterinarians played an important role in performing epidemiological studies to track the virus's progress and adopt containment tactics (Zumla et al., 2016; Shaheen, 2022). Their participation in epidemic response protects animal health while also preventing zoonotic transmission to humans. Cross-sector collaboration is critical for an effective response to EIDs, and veterinarians frequently engage with public health and environmental experts to manage outbreaks.

The One Health paradigm exemplifies this collaborative approach by emphasising the connection of human, animal, and environmental health (Zumla et al., 2016). For example, during the Rift Valley fever outbreaks, veterinarians worked with public health officials to monitor livestock populations and implement vaccination efforts that protected both animal and human health (Zumla et al., 2016; Shaheen, 2022). Such interdisciplinary activities are essential for providing a complete response to zoonotic disease outbreaks. Examples of veterinary participation in EID response efforts abound. The reaction to the

Ebola virus outbreak in West Africa highlighted the role of veterinarians in treating zoonotic illnesses that can spread to humans (Zumla et al., 2016). Similarly, continual surveillance of zoonotic pathogens in animals, as evidenced by studies on tick-borne diseases, highlights the need of veterinarians in early detection and response efforts (Egan et al., 2021; Omondi et al., 2017).

CURRENT CHALLENGES

Integrating veterinarians into One Health emergency planning involves a number of challenges and hurdles that must be addressed in order to maximise the effectiveness of this collaborative strategy. These challenges are caused by a variety of variables, including institutional silos, communication gaps, cultural differences, and limited resources. The presence of institutional and disciplinary divisions is a key obstacle to veterinarians' incorporation into One Health programs. Many health professionals, including veterinarians and physicians, frequently function in silos, resulting in a lack of collaboration and communication (Annand et al., 2020; Speare et al., 2015). This isolation may impede the timely sharing of vital data on zoonotic illnesses, which is required for effective disease surveillance and response (Annand et al., 2020). For example, in Australia, despite multiple health agencies' acceptance of One Health, effective interagency cooperation for zoonotic disease investigations is frequently limited unless a laboratory-confirmed diagnosis is available (Annand et al., 2020). This scenario demonstrates how institutional impediments can stymie the collaborative efforts required for successful One Health adoption. Cultural disparities between veterinary and human health workers further complicate integration efforts. Many veterinarians believe that they are expected to take the lead in One Health programs, yet many feel unprepared or unsupported in this role (Steele et al., 2019). The requirement for behavioural and cultural change among veterinarians and physicians is critical for optimal collaboration (Steele et al., 2019). Furthermore, veterinarians may face scepticism from medical colleagues about their expertise in zoonotic diseases, complicating interprofessional partnerships (Nunes et al., 2022). This lack of mutual respect and

understanding can foster a climate in which collaboration is not prioritised, so harming One Health efforts. Communication barriers between veterinarians and other health providers are another major impediment to efficient integration. Studies have indicated that communication between veterinarians and physicians is frequently inadequate, resulting in missed possibilities for collaboration in public health education and zoonotic disease control (Vale et al., 2021). For example, pet owners generally view veterinarians as trustworthy sources of information about zoonoses, but this confidence is not necessarily exploited in joint efforts with medical experts (Powell et al., 2022). Bridging these communication gaps is critical to ensure that veterinarians can effectively contribute to One Health programs while also having their knowledge recognised and utilised. Limited resources also make it difficult to integrate veterinarians into One Health preparedness. Many veterinarians work in environments where they lack access to the tools, training, and support required to participate effectively in One Health activities (Sawford et al., 2012). For example, in some areas, veterinarians may face logistical constraints such as limited transportation infrastructure, limiting their ability to engage in outbreak surveillance and response operations (Sawford et al., 2012). Furthermore, budgetary restrictions may limit veterinary practices' ability to invest in training and resources that foster partnership with public health authorities (Rabinowitz et al., 2013).

Addressing these resource constraints is crucial for allowing veterinarians to take a more active role in One Health programs. Finally, veterinarians' mental health and well-being can influence their ability to participate in One Health preparation.

CONCLUSIONS

In conclusion, while veterinarians play an important role in One Health preparedness, various challenges and barriers must be addressed to allow their integration into this collaborative framework. Overcoming institutional barriers, cultural differences, communication gaps, and resource constraints will be critical to increasing the success of One Health efforts and ensuring that veterinarians can contribute significantly to global health security.

REFERENCES

- Annand, E., Reid, P., Johnson, J., Gilbert, G., Taylor, M., Walsh, M., ... & Degeling, C., 2020. Citizens' juries give verdict on whether private practice veterinarians should attend unvaccinated Hendra virus suspect horses. *Australian Veterinary Journal*, 98(7), 273-279. <https://doi.org/10.1111/avj.12957>
- Barrett, M., Bouley, T., Stoertz, A., & Stoertz, R., 2010. Integrating a One Health approach in education to address global health and sustainability challenges. *Frontiers in Ecology and the Environment*, 9(4), 239-245. <https://doi.org/10.1890/090159>
- Cleaveland, S., Sharp, J., Abela-Ridder, B., Allan, K., Buza, J., Crump, J., ... & Halliday, J., 2017. One Health contributions towards more effective and equitable approaches to health in low- and middle-income countries. *Philosophical Transactions of the Royal Society B Biological Sciences*, 372(1725), 20160168. <https://doi.org/10.1098/rstb.2016.0168>
- Couto, R. & Brandespim, D., 2020. A review of the One Health concept and its application as a tool for policy-makers. *International Journal of One Health*, 6(1), 83-89. <https://doi.org/10.14202/ijoh.2020.83-89>
- Day, M., 2011. One Health: The importance of companion animal vector-borne diseases. *Parasites & Vectors*, 4(1). <https://doi.org/10.1186/1756-3305-4-49>
- Destoumieux-Garzón, D., Mavingui, P., Boëtsch, G., Boissier, J., Darriet, F., Duboz, P., ... & Voituron, Y., 2018. The One Health concept: 10 years old and a long road ahead. *Frontiers in Veterinary Science*, 5. <https://doi.org/10.3389/fvets.2018.00014>
- Egan, S., Taylor, C., Banks, P., Northover, A., Ahlstrom, L., Ryan, U., ... & Oskam, C., 2021. The bacterial biome of ticks and their wildlife hosts at the urban-wildland interface. *Microbial Genomics*, 7(12). <https://doi.org/10.1099/mgen.0.000730>
- Gado, D., Ehizibolo, D., Meseko, C., Anderson, N., & Lurz, P., 2023. Review of emerging and re-emerging zoonotic pathogens of dogs in Nigeria: Missing link in One Health approach. *Zoonotic Diseases*, 3(2), 134-161. <https://doi.org/10.3390/zoonoticdis3020012>
- Gheorghe-Irimia, R. A., Tapaloaga, D., Sonea, C., Ilie, L. I., & Tapaloaga, P., 2023. Chicken meat production trends in Romania – A twelve-year forecast. *Annals of "Valahia" University of Târgoviște. Agriculture*, 15(1), 6–8. <https://doi.org/10.2478/agr-2023-0002>
- Hassan, O., Affognon, H., Rocklöv, J., Mburu, P., Sang, R., Ahim, C., ... & Evander, M., 2017. The One Health approach to identify knowledge, attitudes and practices that affect community involvement in the control of Rift Valley fever outbreaks. *PLOS Neglected Tropical Diseases*, 11(2), e0005383. <https://doi.org/10.1371/journal.pntd.0005383>
- Horefti, E., 2023. The importance of the One Health concept in combating zoonoses. *Pathogens*, 12(8), 977. <https://doi.org/10.3390/pathogens12080977>
- İnci, A., Doğanay, M., Özdarendeli, A., Düzlü, Ö., & Yıldırım, A., 2018. Overview of zoonotic diseases in Turkey: The One Health concept and future threats. *Turkish Journal of Parasitology*, 42(1), 39-80. <https://doi.org/10.5152/tpd.2018.5701>
- Jones, S., Jerome, N., Jude, N., Ruth, I., Emmanuel, E., James, O., ... & Kazeem, A., 2023. Protective equipment use by veterinarians in Nigeria. *African Journal of Agricultural Research*, 19(1), 61-66. <https://doi.org/10.5897/ajar2022.16214>
- Kariotis, T., Borda, A., Winkel, K., & Gray, K., 2022. Citizen science for One Digital Health: A rapid qualitative review of studies in air quality with reflections on a conceptual model. *Citizen Science Theory and Practice*, 7(1). <https://doi.org/10.5334/cstp.531>
- Modise, B., Mpoloka, S., Settypalli, T., Hyera, J., Natale, A., Ceglie, L., ... & Lamien, C., 2023. A novel multiplex qPCR HRM assay for the simultaneous detection of four abortive zoonotic agents in cattle, sheep, and goats. *Scientific Reports*, 13(1). <https://doi.org/10.1038/s41598-023-39447-1>
- Moraes, D., Baker, A., Wang, X., Zhu, Z., Berg, E., Trevisan, G., ... & Silva, G., 2023. Veterinarian perceptions and practices in prevention and control of influenza virus in the Midwest United States swine farms. *Frontiers in Veterinary Science*, 10. <https://doi.org/10.3389/fvets.2023.1089132>
- Nunes, F., Teixeira, S., Maia, R., Amorim, I., & Mateus, T., 2022. Perception and knowledge of Portuguese veterinarians about the zoonotic transmission of *Helicobacter pylori* and *Helicobacter suis*: The need for One Health intervention. *International Journal of Environmental Research and Public Health*, 19(22), 15087. <https://doi.org/10.3390/ijerph192215087>
- Omondi, D., Masiga, D., Fielding, B., Kariuki, E., Ajamma, Y., Mwamuye, M., ... & Villinger, J., 2017. Molecular detection of tick-borne pathogen diversities in ticks from livestock and reptiles along the shores and adjacent islands of Lake Victoria and Lake Baringo, Kenya. *Frontiers in Veterinary Science*, 4. <https://doi.org/10.3389/fvets.2017.00073>
- Pitt, S., 2024. The One Health concept. *British Journal of Biomedical Science*, 81. <https://doi.org/10.3389/bjbs.2024.12366>
- Powell, L., Lavender, T., Reinhard, C., & Watson, B., 2022. Pet owners' perceptions of COVID-19, zoonotic disease, and veterinary medicine: The impact of demographic characteristics. *Veterinary Sciences*, 9(5), 195. <https://doi.org/10.3390/vetsci9050195>
- Rabaa, M., Tue, N., Phuc, T., Carrique-Mas, J., Saylor, K., Cotten, M., ... & Baker, S., 2015. The Vietnam Initiative on Zoonotic Infections (VIZIONS): A strategic approach to studying emerging zoonotic infectious diseases. *Ecohealth*, 12(4), 726-735. <https://doi.org/10.1007/s10393-015-1061-0>
- Rabinowitz, P., Kock, R., Kachani, M., Kunkel, R., Thomas, J., Gilbert, J., ... & Rubin, C., 2013. Toward proof of concept of a One Health approach to disease prediction and

- control. *Emerging Infectious Diseases*, 19(12). <https://doi.org/10.3201/eid1912.130265>
- Rabinowitz, P., Natterson-Horowitz, B., Kahn, L., Kock, R., & Papaioanou, M., 2017. Incorporating One Health into medical education. *BMC Medical Education*, 17(1). <https://doi.org/10.1186/s12909-017-0883-6>
- Rodríguez-Prieto, V., Vicente-Rubiano, M., Sánchez-Matamoros, A., Rubio-Guerri, C., Melero, M., Martínez-López, B., ... & Sánchez-Vizcaino, J., 2014. Systematic review of surveillance systems and methods for early detection of exotic, new and re-emerging diseases in animal populations. *Epidemiology and Infection*, 143(10), 2018-2042. <https://doi.org/10.1017/s095026881400212x>
- Ryu, S., Kim, B., Lim, J., Tan, C., & Chun, B., 2017. One Health perspectives on emerging public health threats. *Journal of Preventive Medicine and Public Health*, 50(6), 411-414. <https://doi.org/10.3961/jpmp.17.097>
- Santman-Berends, I., 2024. Effectiveness of passive and active surveillance for early detection of SARS-CoV-2 in mink during the 2020 outbreak in the Netherlands. *Transboundary and Emerging Diseases*, 2024, 1-9. <https://doi.org/10.1155/2024/4793475>
- Sawford, K., Vollman, A., & Stephen, C., 2012. A focused ethnographic study of Sri Lankan government field veterinarians' decision making about diagnostic laboratory submissions and perceptions of surveillance. *PLOS One*, 7(10), e48035. <https://doi.org/10.1371/journal.pone.0048035>
- Shaheen, M., 2022. The concept of One Health applied to the problem of zoonotic diseases. *Reviews in Medical Virology*, 32(4). <https://doi.org/10.1002/rmv.2326>
- Sleeman, J., DeLiberto, T., & Nguyen, N., 2017. Optimization of human, animal, and environmental health by using the One Health approach. *Journal of Veterinary Science*, 18(S1), 263. <https://doi.org/10.4142/jvs.2017.18.s1.263>
- Şonea, C., Gheorghe-Irimia, R. A., Tapaloaga, D., Gurau, M. R., Udrea, L., & Tapaloaga, P., 2023b. Optimizing animal nutrition and sustainability through precision feeding: A mini review of emerging strategies and technologies. *Annals of "Valahia" University of Târgovişte. Agriculture*, 15(2), 7-11. <https://doi.org/10.2478/agr-2023-0011>
- Şonea, C., Gheorghe-Irimia, R., Tăpăloagă, D., & Tăpăloagă, P., 2023a. Nutrition and animal agriculture in the 21st century: A review of future prospects. *Annals of the University of Craiova - Agriculture Montanology Cadastre Series*, 53(1), 303-312. <https://doi.org/10.52846/aamc.v53i1.1482>
- Speare, R., Méndez, D., Judd, J., Reid, S., Tzipori, S., & Massey, P., 2015. Willingness to consult a veterinarian on physician's advice for zoonotic diseases: A formal role for veterinarians in medicine? *PLOS One*, 10(8), e0131406. <https://doi.org/10.1371/journal.pone.0131406>
- Steele, S., Toribio, J., Booy, R., & Mor, S., 2019. What makes an effective One Health clinical practitioner? Opinions of Australian One Health experts. *One Health*, 8, 100108. <https://doi.org/10.1016/j.onehlt.2019.10.0108>
- Stenvinkel, P., 2020. The One Health concept – The health of humans is intimately linked with the health of animals and a sustainable environment. *Journal of Internal Medicine*, 287(3), 223-225. <https://doi.org/10.1111/joim.13015>
- Tidman, R., Thumbi, S., Wallace, R., Balogh, K., Iwar, V., Dieuzy-Labayé, I., ... & Trees, A., 2022. United Against Rabies Forum: The One Health concept at work. *Frontiers in Public Health*, 10. <https://doi.org/10.3389/fpubh.2022.854419>
- Tudor, L., Pițuru, M. T., Gheorghe-Irimia, R. A., Şonea, C., & Tăpăloagă, D., 2023. Optimizing milk production, quality and safety through essential oil applications. *Farmacia*, 71(5), 900-910. <https://doi.org/10.31925/farmacia.2023.5.3>
- Vale, B., Lopes, A., Fontes, M., Silvestre, M., Cardoso, L., & Coelho, A., 2021. A cross-sectional study of knowledge on ownership, zoonoses, and practices among pet owners in northern Portugal. *Animals*, 11(12), 3543. <https://doi.org/10.3390/ani11123543>
- Verkola, M., Järvelä, T., Järvinen, A., Jokelainen, P., Virtala, A., Kinnunen, P., ... & Heikinheimo, A., 2021. Infection prevention and control practices of ambulatory veterinarians: A questionnaire study in Finland. *Veterinary Medicine and Science*, 7(4), 1059-1070. <https://doi.org/10.1002/vms3.464>
- Vesterinen, H., Dutcher, T., Errecaborde, K., Mahero, M., Macy, K., Prasarnphanich, O., ... & Pelican, K., 2019. Strengthening multi-sectoral collaboration on critical health issues: One Health systems mapping and analysis resource toolkit (OH-SMART) for operationalizing One Health. *PLOS One*, 14(7), e0219197. <https://doi.org/10.1371/journal.pone.0219197>
- Xie, T., Liu, W., Anderson, B., Liu, X., & Gray, G., 2017. A system dynamics approach to understanding the One Health concept. *PLOS One*, 12(9), e0184430. <https://doi.org/10.1371/journal.pone.0184430>
- Zoonoses and AMR: Silent spreader of superbug pandemic, 2023. *International Journal of Agriculture and Biosciences*, (Zoonosis Volume 4), 186-201. <https://doi.org/10.47278/book.zoon/2023.147>
- Zumla, A., Dar, O., Kock, R., Muturi, M., Ntoumi, F., Kaleebu, P., ... & Petersen, E., 2016. Taking forward a 'One Health' approach for turning the tide against the Middle East respiratory syndrome coronavirus and other zoonotic pathogens with epidemic potential. *International Journal of Infectious Diseases*, 47, 5-9. <https://doi.org/10.1016/j.ijid.2016.06.012>