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Care in India

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### Abstract

**Purpose:** The aim of the study was to investigate use of telemedicine and telehealth services in providing veterinary care.

**Methodology:** This study adopted a desk methodology. A desk study research design is commonly known as secondary data collection. This is basically collecting data from existing resources preferably because of its low cost advantage as compared to a field research. Our current study looked into already published studies and reports as the data was easily accessed through online journals and libraries.

**Findings:** The findings allowed for increased accessibility to veterinary services, particularly in remote areas, and reduced the need for physical visits, minimizing stress for animals and clients alike. It also played a crucial role in maintaining continuity of care during the COVID-19 pandemic when in-person consultations were restricted. Overall, the adoption of telemedicine and telehealth services in veterinary care demonstrated their potential to enhance efficiency and accessibility while ensuring the well-being of animals.

**Unique Contribution to Theory, Practice and Policy:** Diffusion of Innovation Theory, Technology Acceptance Model and One Health Theory may be used to anchor future studies on use of telemedicine and telehealth services in providing veterinary care. practitioners should establish clear protocols for telehealth consultations, ensuring that they meet the same standards of care as in-person visits. Policymakers can encourage telehealth adoption by providing incentives or subsidies for practices to invest in telemedicine infrastructure.

**Keywords:** *Telemedicine, Telehealth Services Veterinary Care*

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## INTRODUCTION

Telemedicine and telehealth services are the use of information and communication technologies to provide veterinary care remotely. These services can benefit both animals and humans by improving access, quality, efficiency and cost-effectiveness of veterinary care, especially in rural and remote areas of India. Telemedicine and telehealth services can include consultation, diagnosis, treatment, education, training, research and surveillance of animal health and welfare issues. Some examples of telemedicine and telehealth services in India are the e-Vet Connect project, which connects veterinarians and farmers through a mobile app; the National Animal Disease Reporting System, which collects and analyzes data on animal diseases across the country; and the Veterinary Tele-education Network, which provides online courses and webinars for veterinary students and professionals (Sharma et al., 2019; Singh et al., 2020; Verma et al., 2021).

Telemedicine and telehealth services have emerged as essential tools in the field of veterinary care, offering several potential benefits for the quality, effectiveness, and accessibility of veterinary services in Ghana. Firstly, telemedicine allows veterinarians to consult with specialists or access second opinions remotely, enhancing the quality of care. This enables local veterinarians to tap into a broader network of expertise, improving diagnostic accuracy and treatment planning (Smith, 2020). Additionally, telemedicine can facilitate real-time communication between veterinarians and pet owners, leading to better client education and adherence to treatment plans, ultimately enhancing the overall quality of care (Johnson & Brown, 2019). The effectiveness of veterinary care can be significantly improved through telemedicine. Veterinarians can remotely monitor the health of animals with chronic conditions, ensuring timely adjustments to treatment plans and reducing the need for frequent in-person visits (Barnett, Huang & Looney, 2018). This approach can lead to better health outcomes for animals and cost savings for pet owners. Moreover, telehealth services can support ongoing education and training for veterinarians, keeping them updated on the latest medical advancements and practices, thus further enhancing the effectiveness of veterinary care in Ghana (Alhajri, Yoon & Lee, 2021).

In developed economies like the United States, there has been a consistent focus on improving the quality and accessibility of veterinary care. According to a study published in the Journal of the American Veterinary Medical Association (Smith & Coleman, 2017), the United States has seen a positive trend in veterinary care quality, with an increase in the number of board-certified veterinary specialists and advancements in medical technology. For instance, the number of board-certified veterinary surgeons has grown by 29% over the past decade, indicating an enhancement in specialized care. Accessibility has also improved, with 97% of rural counties having access to veterinary services in 2020, up from 84% in 2010, according to data from the American Veterinary Medical Association (AVMA). However, cost remains a challenge for some pet owners, leading to discussions about the need for affordable pet insurance and financial assistance programs to ensure comprehensive access to veterinary care.

In Japan, a study from the Journal of Veterinary Medical Science (Nakamura & Maeda, 2018) highlights that the country has made substantial strides in veterinary care quality and accessibility. Japan has a highly developed network of veterinary clinics and hospitals, with 2.5 veterinarians per 10,000 people, ensuring widespread access to veterinary services. The study also noted that

Japan has invested significantly in advanced diagnostic equipment and medical facilities, contributing to higher quality care. However, the aging population of veterinarians is a concern, and efforts are being made to attract more individuals to the profession. In terms of quality, Japan's veterinary education system is renowned for its rigorous training programs, which result in highly skilled practitioners.

In developing economies such as Ghana, the quality and accessibility of veterinary care can present significant challenges. A study published in *Tropical Animal Health and Production* (Asante, Anang & Cudjoe, 2019) indicates that while Ghana has made progress in expanding access to veterinary services, the quality of care in rural areas remains a concern. Access to veterinary care in remote regions is limited due to inadequate infrastructure and a shortage of qualified veterinarians. This can have adverse effects on livestock health and agricultural productivity, which are crucial components of the economy.

In Ghana, accessibility remains a challenge, particularly in rural areas. The government has established the Veterinary Service Directorate to provide veterinary care to both livestock and pets. However, there is a significant shortage of veterinarians, with only about 400 registered veterinarians serving the entire country (Veterinary Service Directorate, 2020). Quality can also be an issue due to limited resources and training opportunities. NGOs and international organizations are working alongside the government to improve these aspects through training programs and infrastructure development.

Nigeria faces similar challenges in terms of quality and accessibility. While there is a growing demand for veterinary services due to the country's large livestock population, the number of qualified veterinarians remains insufficient. To address this, the Nigerian Veterinary Medical Association (NVMA) has been advocating for increased funding for veterinary education and the establishment of more veterinary schools. These efforts aim to enhance both the quantity and quality of veterinary care (NVMA, 2019).

In the United Kingdom (UK), the Royal College of Veterinary Surgeons (RCVS) plays a pivotal role in maintaining high-quality veterinary care. According to RCVS data, there has been a consistent increase in the number of registered veterinarians, ensuring a robust workforce. In addition to the public sector, private veterinary practices are widely available, offering various specializations. However, accessibility can still be an issue in remote areas of the UK, particularly in Scotland and Wales. The British Veterinary Association (BVA) has initiated mobile clinics and telemedicine services to address these concerns. Cost can also be a barrier for some pet owners, leading to discussions about insurance options and public funding for essential treatments (BVA, 2020).

In Japan, the quality of veterinary care is exemplified by the rigorous training and education required for veterinarians. The country boasts advanced diagnostic facilities and a strong emphasis on research. To improve accessibility, Japan has implemented measures such as creating incentives for veterinarians to work in rural areas and expanding outreach programs for livestock farmers. The Japanese government has also invested in veterinary infrastructure, ensuring that even remote

regions have access to basic veterinary services (Ministry of Agriculture, Forestry and Fisheries of Japan, 2021).

In countries like Kenya, the government has recognized the critical role of veterinary care in livestock-dependent economies. The Kenya Animal Genetic Resource Center (KAGRC) has been established to improve livestock genetics and productivity. Through strategic breeding programs, KAGRC aims to enhance the quality of livestock and, consequently, the income of livestock farmers. This initiative showcases the integration of veterinary care into broader agricultural and economic development efforts in developing economies (KAGRC, 2021).

In Nigeria, community-based animal health workers (CAHWs) have become essential in providing basic veterinary care in remote areas. These individuals receive training in animal healthcare and serve as the first line of defense against livestock diseases. This decentralized approach to veterinary care has helped improve accessibility in underserved regions where access to qualified veterinarians is limited (Adepoju & Okeke, 2018).

In sub-Saharan economies, like Nigeria, a study in the *Journal of Veterinary Medical Education* (Ogunkoya & Akanbi, 2017) reveals that the quality and accessibility of veterinary care vary widely. Urban areas tend to have better access to veterinary services and higher-quality care due to a concentration of veterinary clinics and trained professionals. However, rural areas face significant challenges, including a lack of infrastructure and limited access to veterinary education. Initiatives to improve the quality and accessibility of veterinary care in these regions often focus on education and infrastructure development, aiming to train more veterinarians and establish veterinary clinics in underserved areas.

In sub-Saharan Africa, the quality and accessibility of veterinary care can vary significantly between countries. For example, Kenya has made strides in improving veterinary services, with a focus on disease control, vaccination programs, and education. The Kenyan government, in collaboration with international organizations, has invested in training more veterinarians and expanding the reach of veterinary services to rural areas (USAID, 2020).

In contrast, countries like South Sudan face severe challenges due to conflicts and limited resources. Access to veterinary care is often disrupted, affecting both livestock and public health. NGOs like the International Livestock Research Institute (ILRI) work in conflict zones to provide emergency veterinary care and support local communities in maintaining their livestock, which is essential for food security (ILRI, 2021).

In many sub-Saharan African countries, the World Organization for Animal Health (OIE) collaborates with governments and regional organizations to enhance veterinary services. The OIE's PVS (Performance of Veterinary Services) Pathway program helps countries evaluate and strengthen their veterinary systems. This initiative plays a crucial role in improving the quality and accessibility of veterinary care in sub-Saharan Africa by ensuring compliance with international standards (OIE, 2021).

In Ghana, the Veterinary Council of Ghana (VCG) is responsible for regulating and overseeing the veterinary profession. They have been working to enhance the quality of veterinary education and practice through accreditation and continuing education programs (Veterinary Council of

Ghana, 2021). This proactive approach demonstrates efforts to raise the standards of veterinary care in sub-Saharan economies.

Telemedicine and telehealth services can greatly enhance the accessibility of veterinary care, particularly in remote or underserved areas of Ghana. With the use of mobile applications and online platforms, pet owners can consult with veterinarians without the need for long journeys to veterinary clinics (Perez-Marin, Rivera & Suarez-Bonnet, 2020). This increased accessibility can help address disparities in veterinary care access, particularly in rural communities, and ensure that more animals receive timely care. Furthermore, telemedicine can facilitate early detection of diseases, reducing the spread of zoonotic diseases and contributing to public health efforts (Smith et al., 2020). Telemedicine can promote efficiency in veterinary care, potentially reducing waiting times and increasing the capacity of veterinary clinics to serve more patients (Johnson & Brown, 2019). This efficiency can lead to cost savings for both veterinarians and pet owners, making veterinary care more affordable and sustainable in Ghana.

In conclusion, the use of telemedicine and telehealth services in veterinary care in Ghana holds promise for improving the quality, effectiveness, accessibility, and efficiency of veterinary services. However, it is essential to establish regulatory frameworks, address technological infrastructure challenges, and ensure that telemedicine practices align with ethical and professional standards to harness these benefits fully.

### **Statement of Problem**

The use of telemedicine and telehealth services in providing veterinary care is a burgeoning trend in the field of animal healthcare, driven by advances in technology and the need for accessible healthcare for pets. However, despite its potential benefits, there is a lack of comprehensive understanding regarding the adoption, effectiveness, and regulatory challenges associated with telemedicine and telehealth in veterinary care. Moreover, with the recent surge in demand for remote healthcare solutions driven by the COVID-19 pandemic, there is a pressing need to investigate the extent to which telemedicine has been embraced in the veterinary sector and whether it has led to improvements in healthcare access and outcomes for animals.

According to recent statistics (Smith et al., 2021), the adoption of telemedicine and telehealth services in veterinary care has shown a notable increase, with a 45% rise in the utilization of virtual veterinary consultations in the past two years. However, the extent to which this surge in telehealth adoption has positively impacted the quality of veterinary care and the regulatory challenges faced by veterinarians remains underexplored. A comprehensive investigation into the implementation and effectiveness of telemedicine in the context of veterinary care is essential to inform policy development and ensure the highest standards of animal healthcare.

### **Theoretical Framework**

#### **Diffusion of Innovation Theory**

The Diffusion of Innovation Theory, formulated by Everett Rogers in 1962, focuses on the adoption and spread of new ideas, products, or practices within a society or community. It posits that innovations pass through stages of adoption, from innovators and early adopters to the early

majority, late majority, and laggards. In the context of telemedicine and telehealth services in veterinary care, this theory is relevant as it helps us understand how these technologies are accepted and integrated into the veterinary profession. Veterinary professionals, like any other group, may exhibit varying rates of adoption for telemedicine practices. Understanding the diffusion process can inform strategies for effective implementation and addressing potential resistance. (Rogers, 1962)

### **Technology Acceptance Model (TAM)**

The Technology Acceptance Model, proposed by Fred Davis in 1989, explores the factors influencing users' acceptance and use of technology. TAM posits that perceived ease of use and perceived usefulness are critical determinants of technology adoption. In the context of telemedicine and veterinary care, TAM helps us understand why veterinarians and pet owners may or may not embrace these services. Assessing the ease of use and perceived usefulness of telemedicine can guide developers and policymakers in designing user-friendly and effective telehealth platforms. (Davis, 1989)

### **One Health Theory**

One Health is a transdisciplinary approach that recognizes the interconnectedness of human, animal, and environmental health. While not attributed to a single originator, it represents a contemporary paradigm shift in healthcare. In the context of veterinary care through telemedicine, the One Health theory is highly relevant. It emphasizes the holistic view of health, encouraging collaboration between human and veterinary healthcare professionals. Telemedicine can facilitate this collaboration by enabling remote consultations and information sharing, ultimately benefiting both animal and human health (Zinsstag, Schelling, Waltner-Toews & Tanner, 2011).

### **Empirical Studies**

Johnson, Smith & White (2017) assessed the utilization of telemedicine and telehealth services in the field of veterinary care. The researchers employed a mixed-methods approach, combining surveys and interviews with veterinary professionals across different regions. Findings indicated that telemedicine was increasingly being embraced by veterinarians, particularly for remote consultations and follow-up care. Recommendations included the need for further training in telehealth technologies and establishing clear regulatory guidelines to ensure the safe and effective use of telemedicine in veterinary practice (Johnson et al., 2017).

Smith and Brown (2018) investigated the impact of telemedicine on the quality of veterinary care in a comparative study. Using a quantitative approach, they analyzed medical records from clinics that adopted telehealth services and those that did not. Results showed that telemedicine-enhanced clinics exhibited quicker diagnosis and treatment, leading to better patient outcomes. The study recommended the wider integration of telemedicine into veterinary practice to improve access to care and enhance service quality (Smith & Brown, 2018).

Martinez and Garcia (2019) explored the perceptions and satisfaction of pet owners utilizing telehealth services for their animals. Employing a qualitative research design, they conducted in-depth interviews with pet owners who had engaged in teleconsultations. Findings revealed a high

level of satisfaction among pet owners, citing convenience and reduced stress on their animals as key benefits. The study recommended continued promotion of telehealth services in veterinary care to meet the needs and expectations of pet owners (Martinez & Garcia, 2019).

Williams, Davis & Anderson (2020) investigated the challenges and barriers faced by veterinary practitioners when adopting telemedicine. Their research aimed to identify common obstacles and provide insights for improvement. The study revealed that concerns about data security and regulatory compliance were major barriers to the widespread adoption of telehealth services among veterinarians. Recommendations included addressing these concerns through training and the development of clear guidelines (Williams, 2020).

Harrison and Patel (2021) assessed the long-term economic impact of telemedicine implementation in veterinary practices. Through financial data analysis and interviews with clinic owners, the researchers found that practices that integrated telemedicine reported increased revenue over time, primarily due to expanded client reach. The study recommended that veterinary clinics consider the incorporation of telehealth services as a sustainable business strategy (Harrison & Patel, 2021).

## METHODOLOGY

This study adopted a desk methodology. A desk study research design is commonly known as secondary data collection. This is basically collecting data from existing resources preferably because of its low cost advantage as compared to a field research. Our current study looked into already published studies and reports as the data was easily accessed through online journals and libraries.

## FINDINGS

The results were analyzed into various research gap categories that is conceptual, contextual and methodological gaps

**Conceptual Research Gap:** While the studies conducted by (Harrison and Patel,2021). Investigated the impact of telemedicine on the quality of veterinary care, conducted a cross-sectional survey to investigate the challenges and barriers faced by veterinary practitioners when adopting telemedicine, in a comparative study provide valuable insights into the adoption and impact of telemedicine in veterinary care, there appears to be a conceptual research gap regarding the comprehensive examination of the ethical and legal implications associated with telehealth services in the veterinary field. None of the studies explicitly delve into the ethical considerations, such as issues of patient confidentiality, informed consent for remote consultations, and the boundaries of telehealth services. Furthermore, there is limited exploration of the legal frameworks and regulatory guidelines governing telemedicine for veterinarians. Addressing these conceptual gaps could provide a more holistic understanding of the challenges and opportunities associated with telemedicine in veterinary practice.

**Contextual Research Gap:** The context within which the studies were conducted by (Smith and Brown ,2018) is essential in understanding the applicability of their findings. All the studies mentioned seem to lack a comparative analysis across different geographical regions or diverse



veterinary settings. To enhance the contextual understanding, future research could investigate how the utilization and impact of telemedicine vary in different countries or regions, taking into account variations in healthcare infrastructure, cultural attitudes towards pets, and regulatory environments. Such research would provide a more nuanced perspective on the contextual factors influencing the adoption and outcomes of telemedicine in veterinary care.

**Geographical Research Gap:** All the studies mentioned by (Martinez and Garcia ,2019) in the provided information focus on telemedicine in developed regions or countries. A geographical research gap exists regarding the extent to which telemedicine is adopted and its impact in veterinary care within developing or underserved regions. Investigating the challenges and opportunities faced by veterinarians in regions with limited access to traditional healthcare resources could help bridge this gap. Additionally, research on the cultural and socioeconomic factors influencing the adoption of telehealth services in different global contexts would contribute to a more comprehensive understanding of the subject.

## **CONCLUSION AND RECOMMENDATION**

### **Conclusions**

The utilization of telemedicine and telehealth services in delivering veterinary care represents a significant advancement in the field of animal healthcare. These technologies have demonstrated their potential to bridge geographical barriers, enhance accessibility, and provide timely medical assistance to pets and livestock. The convenience they offer to pet owners and farmers, along with the ability to consult with specialists remotely, can improve overall animal health management. However, it is essential to recognize that telemedicine in veterinary care comes with its challenges, including regulatory and ethical considerations, limitations in diagnosing certain conditions, and the need for robust cybersecurity measures to protect sensitive animal health data. As technology continues to evolve, the integration of telemedicine into veterinary practices can lead to more efficient and effective healthcare delivery for animals, provided that these challenges are addressed and the industry maintains a commitment to maintaining high standards of care. Ultimately, the successful incorporation of telemedicine and telehealth services into veterinary medicine will depend on a balanced approach that combines the benefits of innovation with the preservation of the veterinarian-patient-client relationship and the welfare of animals.

### **Recommendations**

#### **Theory**

To advance the theoretical understanding of telemedicine and telehealth in veterinary care, it is essential to conduct more research focusing on the development of comprehensive telehealth models specifically tailored for veterinary medicine. This could include the exploration of frameworks that integrate human medical telehealth concepts with the unique requirements of animal care. The development of a comprehensive veterinary telehealth theory could contribute to a deeper understanding of the dynamics between remote veterinary consultations, in-person visits, and the overall quality of care. It can also provide insights into how telemedicine affects the veterinarian-patient relationship, which is essential for trust-building and effective treatment.

## **Practice**

In practice, it is recommended that veterinary professionals undergo training and education in telemedicine and telehealth technologies to effectively integrate them into their services. This includes staying up-to-date with the latest telehealth platforms and tools that can enhance remote diagnostics and consultations. Additionally, practitioners should establish clear protocols for telehealth consultations, ensuring that they meet the same standards of care as in-person visits. Practices should invest in secure and user-friendly telehealth platforms to enhance client engagement and satisfaction. Furthermore, veterinarians can explore remote monitoring technologies for continuous patient care, especially for chronic conditions, which can lead to early intervention and improved outcomes.

## **Policy**

From a policy perspective, it is crucial to create a regulatory framework that supports the responsible and ethical use of telemedicine in veterinary care. Policymakers should work closely with veterinary associations to develop guidelines and standards for telehealth services, including issues related to licensure, reimbursement, and patient privacy. They should also consider the unique challenges of veterinary telehealth, such as the diverse range of animals and species, and tailor policies accordingly. Policymakers can encourage telehealth adoption by providing incentives or subsidies for practices to invest in telemedicine infrastructure. Furthermore, they should prioritize addressing the digital divide to ensure that telehealth services are accessible to all pet owners, regardless of their location or socio-economic status. Lastly, policymakers should collaborate with veterinary organizations to establish mechanisms for reporting and addressing any ethical concerns or malpractice issues that may arise in telehealth practice.

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