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AI AND TELEMEDICINE IN PAKISTAN: REGULATING DIGITAL HEALTH THROUGH LEGAL INNOVATION

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Abstract

The healthcare industry in Pakistan is experiencing a rapid change with the integration of artificial intelligence (AI) and telemedicine, which is increasing accessibility, accuracy, and efficiency of medical services. Even today, this online revolution requires a strong legal and regulatory framework to support the safety of patients, privacy of patient data and other ethical uses of technology. In Pakistan, today, a combination of patchwork regulations, such as the regulations of the Pakistan Medical and Dental Council (PMDC), the PECA 2016, or the general health laws, is required, not all of which are created in a manner that would fully address the needs of AI-based diagnostics, digital prescriptions, cross-border consultations, and the question of liability. To create consumer confidence, it can be beneficial to create specific regulations of digital health, to incorporate the international best practices, to develop licensing policies of telehealth workers, and to enforce the strictest cybersecurity rules. The governance could be simplified by a special digital health authority. Potential regulation will make Pakistan harness AI and telemedicine in a responsible way and deliver healthcare in a safe, equitable, and future-ready manner.

Keywords: challenges, historical context, laws, opportunities, theoretical context

Introduction

Artificial intelligence (AI) and telemedicine are converging, and this transformation opportunity is opening up a lot of potential to see clinical expertise, enhance diagnostic accuracy, and make the most of limited resources (Donahoe & Metzger, 2019), in the healthcare system in Pakistan (Habib et al., 2025; Murtaza et al., 2026). Remote-care platforms were less popular prior to the COVID-19 pandemic, which demonstrated to both the world and the healthcare system the potential of telemedicine in rural communities and to the overburdened healthcare system, demonstrating the usefulness of telemedicine (Jawed et al., 2026; Tariq & Saeed, 2025). By identifying these gaps, discussions on the policy-level and national structure accentuate the necessity of organizing the telehealth governance and standardizing the mechanisms of service delivery (Khanan et al., 2026).

Simultaneously, international and national scholarship underlines that AI in health should be stipulated by ethically based principles of transparency, accountability, equity, privacy, and safety to avoid harm such as algorithmic bias and misuse of patient data (Umer et al., 2023). In the case of Pakistan, the creation of the proper regulation framework will involve balancing telemedicine practice with AI governance standards, establishing the liability framework, and ensuring data-protection measures, as well as developing the certification procedure of AI clinical tools (Irfan & Yaqoob, 2024; Murtaza et al., 2026). Regulation buffered, context-sensitive regulation based on the capacity of the health system in Pakistan will be necessary in order to achieve benefits, as the risks of malpractice liability and privacy breach will be managed (Abbas et al., 2024; Sayani et al., 2025).

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Research Justification

The recent and rapid development of telemedicine and artificial intelligence (AI) in healthcare has generated an immediate necessity to supply a properly established regulatory framework in Pakistan. Although there is an increasing trend of choosing digital health (in particular, the global situation escalated due to the COVID-19 pandemic), the nation has no detailed legislation on the topic of virtual consultations, AI-based diagnostics, safety of patient information, and medical practice across provincial borders. It is one of the gaps in regulations that puts patients, healthcare providers, and institutions at risk of misdiagnosis, privacy invasion, unlicensed practice, and ambiguous liability. Thus, studies on this topic are crucial to inform policymakers on how to develop a safe and reliable digital-health ecosystem.

Moreover, the use of AI in clinical decision-making poses novel ethical and legal issues of algorithmic bias, transparency, and accountability. The current health legislation in use in Pakistan was based on traditional and in-person medical practice and lacks a proper response to automated decision-support systems and storage and processing of sensitive digital medical information. With increasing digital health, the lack of dedicated regulation can further disparage health inequities and decrease the confidence of populations in technologically driven care. Through the analysis of global best practices and the socio-legal situation in Pakistan, this research contributes to formulating progressive, just, and enabling digital-health regulation.

Literature Review

The research on telemedicine and AI in the country indicates that there is great potential in telemedicine and AI, and significant institutional, infrastructural, and ethical gaps that persist (Donahoe & Metzger, 2019; Khanan et al., 2026). The ability of telemedicine to increase access, particularly for rural and underserved populations, has been reported in both national reviews and systematic literature reviews, which report improvements in access and resource utilization with concomitant limitations in its access due to unreliable connectivity, less digital literacy, and variable regulatory practice (Murtaza et al., 2026). The recognition of such opportunities at the national level (e.g., the Federal Policy for Telemedicine and the National Digital Health Framework) points to the official acknowledgment of such opportunities (Jawed et al., 2026). Still, according to scholars, policy has been decentralized and slow in addressing issues of licensure, cross-jurisdictional practice, and standards of clinical responsibility (Irfan & Yaqoob, 2024).

A more tangible legal approach is provincial initiatives such as the Sindh Telemedicine and Telehealth Act, 2021, which provides statutory definitions and registration as well as patient-safety measures. Still, the ability to implement and harmonize with federal guidance remains a point of weakness (Abbas et al., 2024). According to empirical research of clinicians and trainees, the readiness among physicians and trainees is ambivalent, surveys indicate that many doctors lack previous experience in telemedicine, and they are worried about training, diagnostic reliability, and data security, which impede their adoption by clinicians and adherence by patients (Tariq & Saeed, 2025).

Pakistani reviews and non-Pakistani guidance on AI appreciate the usefulness of AI in diagnostics and in triage and system optimization, but warn of risky activities like algorithmic bias, lack of openness, and risks to data privacy (Habib et al., 2025). The ethics and governance guidance published by the World Health Organization will offer principles, such as

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transparency, accountability, safety, and equity, and are liberally suggested as a framework of national regulation of AI in health (Umer et al., 2023).

Literature synthesis reveals legal innovation is urgently needed: Pakistan needs interoperability of digital health standards, data-protection regulations specific to health information, certification possibilities of AI clinical tools, and regulatory and clinician capacity-building (Murtaza et al., 2026). In the absence of organized regulation by the federal and provincial governments and investments in training and infrastructure development, the advantages of AI-empowered telemedicine may be uneven, and they can further contribute to the prevalence of health inequalities (Sayani et al., 2025).

Historical Context of AI and Telemedicine in Pakistan

The history of telemedicine and artificial intelligence (AI) development in Pakistan has passed several phases influenced by the technological advances and changes in healthcare demands (Murtaza et al., 2026; Sayani et al., 2025). The emergence of telemedicine initially in the early 2000s in small-scale NGO-led and privately based pilot projects, which were based on phone calls, emails, and rudimentary video connections between the urban doctor and the patient in the remote location, gave birth to telemedicine (Tariq & Saeed, 2025). These initial initiatives were informal with no legal or professional standards in place, and they represented a lack of national policy in digital health (Abbas et al., 2024).

In the 2010s, a rise in internet penetration and smartphone adoption promoted the emergence of a structured teleconsultation platform by private hospitals and startups (Irfan & Yaqoob, 2024). Nonetheless, the regulatory control was very weak, and healthcare providers rested on general medical-practice regulations and the Prevention of Electronic Crimes Act (PECA) 2016 when it came to matters related to data security (Habib et al., 2025). It is a turning point in the development of virtual consultations, as the COVID-19 pandemic has compelled the country to set virtual consultations nationwide, and the federal government developed the first draft Telemedicine Policy in the country, as provinces such as Sindh started to develop their own telehealth laws (Umer et al., 2023).

In the meantime, AI found its way into the healthcare sector of Pakistan approximately in 2018 with the scholarly work of radiology, diagnostics, and predictive analytics. However, the lack of AI-specific regulation also brought ambiguity to the data usage, accountability to algorithms, and patient protection (Jawed et al., 2026). This development underscores the increasing demand by Pakistan for legal innovation about the safe integration of AI-enabled telemedicine into mainstream healthcare.

Theoretical Context of AI and Telemedicine in Pakistan

Regulating AI and telemedicine in Pakistan has a theoretical basis on three main frameworks, namely, health-law theory, technology-governance theory, and digital ethics.

Health law theory focuses on the safety, the professional competence, and the accountability of patients. Digital health is a domain in which, when used, teleconsultations and AI-aided decision-making must be put to the same legal and ethical standards as traditional medical practice. This theory defends the fact that licensure should be clear; there should be digital prescription guidelines given, as well as liability in situations where AI makes a difference in diagnosis or treatment.

Technology-governance theory is about controlling the new technologies with adaptive, flexible, and proportionate laws. Due to the dynamic development of AI and telemedicine, this theory emphasizes such aspects as responsive regulation, multi-stakeholder management, and

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constant changes in policies. It warrants the establishment of digital health regulatory agencies and federal-provincial relations, structured in Pakistani settings.

The digital ethics theory gives the moral guidelines required to have safe AI execution, such as transparency, fairness, privacy, and non-discrimination. Such principles are consistent with other boards at an international level, including the ethics of AI in health at the WHO. This theory highlights the need for robust data-protection legislation and preventing biases in automated decision-making in Pakistan. All these theoretical views lead to the conclusion that Pakistan needs legal innovation as it aims to regulate digital health.

Laws Regarding AI and Telemedicine in Pakistan

The most important milestone is the Sindh Telemedicine and Telehealth Act, 2021, which was adopted within the province of Sindh. Under this Act, telemedicine, which covers telehealth services performed using secure audio/video communication, store-and-forward media, or even automated computer programs (i.e., possibly using AI), is explicitly identified as a means of health care delivery. This law stipulates that all medical workers who give telehealth services need to be registered (become a Registered Medical Practitioner or RMP) by completing an online course, as required.

The Act requires safeguarding of patient information: do not share the information about patients without informed consent of the patient (or other authorized person), and also provides the penalties (e.g., fine of Rs100,000 and/or a maximum prison term of up to two years) in case of a confidentiality breach. When telehealth is concerned with medicines being prescribed, only the medicines that are approved by the corresponding regulator (Drug Regulatory Authority of Pakistan, DRAP) can be prescribed.

In line with the PMDC Act, 2022, the medical professionals are to act in accordance with the regulations of the Pakistan Medical and Dental Council (PMDC). They have their professional code of ethics that applies to online/telemedicine. Medical devices and diagnostic tools, software-as-medical-devices, etc., covered by the DRAP regime (manufacture, import, sale, licensing) are likely to apply where software or devices are considered to be medical devices. The gadgets or equipment that use telecom or internet frequencies can be the subject of surveillance by the Pakistan Telecommunication Authority (PTA), particularly when they utilize telecommunication technologies.

Challenges for AI and Telemedicine in Pakistan

The adoption of artificial intelligence (AI) and telemedicine into the healthcare system of Pakistan offers a lot of opportunities and, however, great challenges, especially in the legal and regulatory sphere. One of the most urgent challenges is a deficiency of an extensive legal framework of digital health. Whilst there has been a swift development in the area of AI and telemedicine applications, Pakistan does not possess specific legislation connected with the privacy and security of information and patient consent, which is a critical concern when providing healthcare in a morally responsible manner. In the absence of such structures, sensitive health information of patients can be abused or accessed by an unauthorized individual and thereby jeopardize the trust of patients on the digital health solutions.

The other important challenge is the lack of regulatory capacity and competence. The relevant governmental agencies, including the Ministry of National Health Services and the Pakistan Telecommunication Authority, might be unqualified in technical expertise to analyze the AI algorithms, claim telemedicine platforms, and track the adherence to the new standards. This loophole increases the likelihood of the markets being saturated with bad or unscrupulous AI-powered diagnostic instruments.

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Opportunities for AI and Telemedicine in Pakistan

The adoption of a combination of artificial intelligence (AI) and telemedicine in Pakistan presents great possibilities to enhance the process of healthcare delivery, especially with the assistance of innovative legal frameworks. One of the greatest opportunities is increased access to healthcare. Telemedicine will assist in bridging the gap of rural population which is underserved by medical services in urban centers and provide patients with the opportunity to see doctors remotely. This growth can be efficiently and safely facilitated by legal regulations that grant licensure, standards of care and the right to practice across regions. The potentialities of AI-based applications are enhanced diagnostic accuracy and personalized medicine. The AI algorithms are potentially useful in the early identification of diseases, in treatment planning, and in predictive healthcare management, based on large datasets. Medical workers need to get more familiar with adopting these technologies because there are legal frameworks to unify AI validation, certification, and liability and to make the regulations governing accountability clear.

Another possible advantage is data-driven healthcare policies. By establishing well-developed legal frameworks to protect health data collection, sharing, and analysis, policymakers will be able to utilize AI analytics to reveal the trends in society on the overall health of the population and resource utilization, and enhance health outcomes. Public confidence in digital health systems can also be developed by providing legislation to ensure the privacy and consent of patients. Furthermore, AI and telemedicine open up innovation in medical education and professional training possibilities. Augmented skills of healthcare professionals can be promoted by means of virtual simulations, artificial intelligence-based learning platforms, or tele-mentoring. Such digital training modules can be formalized to be part of professional development through legal recognition.

The regulatory sandbox legal provisions that would provide an opportunity to test AI-driven health technologies under controlled conditions may also motivate the private sector. Lastly, using AI and telemedicine to improve the Pakistani healthcare system can make the relationship between the people and the government stronger, boost the economy, and make Pakistan a leader in digital health. By using legal innovation to create clear, ethical, and enforceable standards, Pakistan can change the state of its healthcare and make sure that all of its citizens have access to fair, efficient, and technology-driven healthcare services.

Conclusion

Telemedicine and AI are game-changers to the Pakistani healthcare system, and the possibility of AI resolving issues of the medical system, like a shortage of quality medical care and workforce, along with the inefficiency in providing services to its citizens. Yet, their effective application will be based on well-developed legal frameworks that will have to regulate data privacy, patient consent, liability, and ethical application of technology. Just as infrastructural constraints, the current level of digital illiteracy as well as regulatory gaps are problematic in this regard, also pointing to the fact that there are areas where particular legal innovation can be of substantial impact.

Recommendations

A well-organized and proactive regulatory strategy is needed to successfully utilize AI and telemedicine in the healthcare system of Pakistan. To begin with, there ought to be all-inclusive digital-health legislations that enforce privacy of patient information, accountability

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in algorithms, informed consent and trans-jurisdictional teleconsultation. In scenarios of AI-aided clinical mistakes, these laws ought to establish explicit liability measures to define who ought to assume responsibility when it comes to healthcare, software development and digital health systems.

Second, regulatory institutions have to be enhanced (with technical capacity-building efforts). The professionals that deal with the regulation of digital health need particular competence to analyze AI algorithms and certified telemedicine platforms and ensure that ethical standards are addressed. Regulatory sandboxes can be introduced to facilitate the lower-risk innovation wherein pioneering work can be conducted on a controlled basis and safe testing in an experimental setting is possible, without putting patients at risk.

Third, digital infrastructure and professional training have to be invested into. The expansion of broadband and increased digital literacy, and imparting medical schools with skills in telemedicine will help bring the uptake in the country more towards a more equal distribution. Lastly, the establishment of both effective and sustainable positive-public partnerships and ethical review system sustainability will help to maintain the digital health innovation as transparent, accountable and aligned with the overall Pakistan-wide public health goals. Fourth, innovation, share of resources and equitable access should be encouraged by creating partnership between the businesses and the city. In order to further train and develop medical professionals, cooperation with universities and research centers might become helpful.

Lastly, the ethical supervision systems and the constant control mechanism are needed to support accountability, patient safety and the trust in the community. All these can lead to the development of safe, efficient and sustainable digital health ecosystem in Pakistan.

Research Limitations

This study has a number of limitations that can compromise the thoroughness and applicability of its results. To begin with, the analysis was limited by the fact that primary data is scarce on the delivery of AI and telemedicine in Pakistan, which meant that the analysis had to be based on secondary sources, including reports, scholarly articles, and policy documents. Second, due to the fast-changing state of AI technologies, not all of the innovations and regulatory processes might be well reflected, which can result in a change in the topicality of some recommendations. Third, inter-regional differences in medical facilities and digital literacy could not be adequately measured, and the possibility of extrapolating the results to all rural and urban residents was limited. Fourth, the legal and regulatory systems in Pakistan are in the process of transition, which brings ambiguity in the process of policy interpretation and applicability. Lastly, the regulatory and legal perspective takes center stage with only little attention given to such aspects of the study as the technical performance, the economic viability, and the behavioral responses of patients.

Research Implications

The paper highlights the opportunities of legal innovation to both enable equitable access to healthcare, particularly for the underserved rural communities, and encourage the safe use of AI-based diagnostics and telemedicine platforms. To healthcare providers, the results advocate the need to incorporate the use of digital health tools into the existing clinical practice in line with the emergent legal requirements. The study provides an insight to the capacity-building, infrastructure development and ethical oversight to the policymakers so that the right decisions can be made to encourage the innovation without taking a risk. Lastly, the research provides new avenues of future empirical studies to determine the efficacy of AI and

telemedicine interventions, contribute to developing evidence-based practice and modernizing the healthcare system in Pakistan, and increase the population's adherence to digital health services.

Further Research Directions

The future research on AI and telemedicine in Pakistan should be conducted on empirical and theoretical issues to inform the digital health policy and practice. To share practice-level evidence of the effectiveness, efficiency and patient outcomes of telemedicine services and AI-based diagnostics, time-bound studies on the efficacy, efficiency, and patient outcomes of telemedicine services and AI-based diagnostics can be used. Second, geographic studies should be carried out to understand the effects of infrastructure and digital literacy, as well as socioeconomic factors, on the uptake and access of telemedicine and AI in urban and rural areas.

Third, technological, medical, and law research will help to evaluate the practicality of regulations, liability, and ethics, and further provide actionable advice on legal innovation. Fourth, studies of perception, trust, and response of the public towards telemedicine and AI will inform programs of awareness and adoption. Finally, research can be undertaken on successful case studies from other countries that have leveraged AI in healthcare and can be used to inform cost-effective, locally applicable policies and technologies in Pakistan.

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