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Exploring the Role of AI and Machine Learning in Improving Healthcare Diagnostics and Personalized Medicine

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Abstract

This paper explores the transformative role of Artificial Intelligence (AI) and Machine Learning (ML) in enhancing healthcare diagnostics and treatment plans, with a focus on radiology, mental health, and chronic disease management. AI's integration into radiology improves diagnostic accuracy by enabling the detection of subtle anomalies in medical images, thus facilitating early disease detection and minimizing human error. In mental health, AI-driven predictive modeling allows for the early identification of at-risk individuals, enabling timely interventions and personalized treatment plans that improve patient outcomes. The paper also examines AI's impact on chronic disease management, highlighting its use in predictive analytics to forecast disease progression and develop individualized treatment strategies, optimizing patient care. The scalability of AI solutions in resource-limited settings is also explored, demonstrating how AI can bridge healthcare gaps in underserved regions by automating processes and supporting healthcare workers with decision-making tools. Finally, the paper suggests future research directions, including the integration of AI with emerging technologies like blockchain and the Internet of Things (IoT) to further optimize healthcare delivery, especially in low-resource environments.

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1. Introduction

1.1 Context and Rationale

The integration of artificial intelligence (AI) and machine learning (ML) in healthcare represents a significant leap forward in medical diagnostics and treatment. These technologies harness large datasets, including medical records, imaging data, and genomic information, to uncover patterns that are often invisible to the human eye ^[1, 2]. In areas such as radiology, mental health, and chronic disease management, AI and ML offer the potential to improve diagnostic accuracy, reduce the time required for interpretation, and ultimately optimize treatment plans ^[3, 4]. These advances enable healthcare professionals to deliver personalized, timely, and more accurate interventions, addressing both common and complex health issues. The rise of AI in healthcare is transformative, bridging the gap between advanced technology and clinical practice, while also addressing long-standing challenges like physician workload and the rising demand for healthcare services ^[5, 6].

The benefits of AI and ML in healthcare are especially apparent in resource-limited settings, where access to trained specialists and diagnostic tools may be scarce.

AI-powered systems, in these cases, offer the potential to democratize healthcare by providing support for diagnoses and treatment decisions where human resources are limited^[7, 8]. This capability is poised to become an essential tool for improving healthcare equity worldwide, offering scalable solutions to previously insurmountable challenges, such as healthcare access in remote or underserved areas^[9, 10].

1.2 Research Gap

Despite the tremendous promise of AI and ML in healthcare, significant gaps persist in their implementation, especially in specific fields like radiology, mental health, and chronic disease management. In radiology, while AI has shown promise in image recognition, there is still a lack of universal adoption due to issues related to standardization, training, and integration into clinical workflows^[11]. Many healthcare facilities, particularly in low-resource settings, struggle to implement AI-based tools that can support diagnostic decision-making. Similarly, in the realm of mental health, AI's potential to predict conditions like depression and anxiety is often underutilized. There are concerns about the generalizability of AI models and their ability to account for the complexity of mental health conditions across diverse populations^[12, 13].

Chronic disease management is another area where AI and ML could make significant improvements, but challenges remain. In resource-limited settings, the lack of electronic health records (EHR) infrastructure and poor data quality hinder the effective use of predictive models for conditions such as diabetes and hypertension^[14, 15]. Moreover, there is a lack of research into how AI can be adapted to local needs and conditions, particularly in low-income or rural areas. Addressing these gaps is essential for ensuring that AI and ML technologies can reach their full potential in improving health outcomes across the globe^[16, 17].

1.3 Objectives and Scope

The primary objective of this paper is to explore the role of AI and ML in improving healthcare diagnostics and personalized medicine, with a specific focus on their application in radiology, mental health, and chronic disease management. This paper will assess the current state of AI and ML technologies in these domains, highlighting successful use cases, challenges, and areas for further research. It will also propose a model for integrating AI and ML into healthcare diagnostics that can be adapted for resource-limited settings, ensuring that these advancements are accessible globally.

The scope of the paper will address the technical, ethical, and practical considerations of implementing AI in healthcare, particularly in environments with constrained resources. By focusing on diagnostics and treatment optimization, this paper aims to provide a comprehensive overview of how AI can improve the accuracy and efficiency of healthcare delivery. Ultimately, the paper seeks to contribute to a more nuanced understanding of AI's potential in healthcare and offer actionable insights for future advancements, particularly in underserved areas where the need for innovative solutions is most pressing.

2. AI and machine learning in radiology

2.1 Diagnostic Accuracy

AI and machine learning (ML) have demonstrated substantial improvements in the accuracy of medical image analysis,

particularly in radiology. These technologies excel in detecting minute anomalies in medical images, such as X-rays, MRIs, and CT scans, that may be difficult for human radiologists to identify, especially in complex or early-stage cases^[18, 19]. By training on large datasets, AI models are able to recognize patterns in imaging data that correspond to specific conditions, from cancers to fractures, thus increasing diagnostic precision. For instance, AI-powered systems are capable of identifying subtle changes in tissue structure or abnormalities, enabling earlier detection of diseases like breast cancer or lung nodules. This ability to detect anomalies with high sensitivity and specificity significantly reduces the risk of misdiagnosis, which is crucial for improving patient outcomes^[20, 21].

Furthermore, AI's diagnostic accuracy is continuously improving as it learns from vast amounts of data. As more images are analyzed and more diagnostic variables are incorporated into models, the AI system becomes better at distinguishing between benign and malignant conditions, improving both diagnostic confidence and efficiency. This enhanced precision is not only crucial for accurate disease detection but also for optimizing patient treatment plans, as it provides healthcare providers with more reliable and timely information to guide clinical decisions^[22, 23].

2.2 Automation and workflow efficiency

One of the significant benefits of AI and ML in radiology is the ability to automate routine tasks and streamline workflows. Traditionally, radiology departments have been burdened with the time-consuming task of manually reviewing and interpreting large volumes of medical images, which can lead to delays in diagnosis and increased workload for radiologists. AI systems, by automating image analysis, can quickly process and interpret medical images, flagging potential abnormalities for further review. This automation not only speeds up the diagnostic process but also enhances workflow efficiency by reducing the number of images that require manual attention^[24-26].

Moreover, AI-driven automation helps to reduce human error by providing consistent and objective analysis, unaffected by fatigue or cognitive biases that can impact human radiologists. This consistency is particularly important in high-volume environments, where radiologists may be working under significant time pressure. By increasing throughput without compromising accuracy, AI allows radiologists to focus on more complex cases that require their expertise. In addition, AI tools can be integrated into existing radiology systems, enhancing the capabilities of traditional workflows and helping to maintain high standards of care while improving operational efficiency^[27, 28].

2.3 Challenges and Limitations

Despite its potential, the adoption of AI in radiology faces several technical and ethical challenges, particularly in resource-limited settings. One of the primary technical barriers is the need for high-quality, annotated datasets to train AI models effectively. In many healthcare environments, especially in low-income countries, access to well-annotated medical images and the infrastructure to collect and store large datasets is limited. Without these resources, the development and deployment of accurate AI systems become difficult, hindering the widespread use of AI in radiology^[29, 30].

Ethically, the use of AI in radiology raises concerns about the

potential for algorithmic bias. If AI models are trained on datasets that are not representative of diverse patient populations, the system may not perform equally well across different demographics. For example, AI systems trained primarily on data from one ethnic group may not perform as effectively for patients from other ethnic backgrounds, leading to disparities in care. Additionally, there are concerns about the role of radiologists in the diagnostic process^[31, 32]. While AI can aid in diagnosis, it cannot replace the clinical judgment and expertise that radiologists bring. This raises questions about the balance between human oversight and AI automation, particularly in settings where resources are scarce, and human expertise is stretched thin. Addressing these challenges is critical to ensuring the ethical and equitable implementation of AI in radiology, particularly in underserved regions^[33, 34].

3. AI and mental health diagnostics

3.1 Predictive modeling for mental health disorders

AI's use in predictive modeling for mental health disorders has the potential to revolutionize how we understand and address conditions such as depression, anxiety, schizophrenia, and bipolar disorder^[35]. By analyzing large volumes of patient data, including demographic information, behavioral patterns, genetic factors, and historical health records, AI can predict the onset or progression of these conditions with remarkable accuracy. Machine learning algorithms can identify early warning signs of mental health issues by detecting subtle patterns that may go unnoticed by human clinicians. For example, AI models can analyze speech patterns, social media activity, and even facial expressions to gauge emotional well-being and predict whether a person may develop a mental health disorder^[36]. The predictive power of AI enables early interventions, which are critical for improving patient outcomes. For individuals at risk of developing conditions like depression or anxiety, timely identification through AI could facilitate preventative measures, such as counseling or medication, before the condition worsens. By acting earlier in the disease process, healthcare providers can reduce the severity and duration of mental health disorders, leading to better long-term outcomes for patients and alleviating the overall burden on healthcare systems^[37].

3.2 Personalized treatment plans

One of the most promising applications of AI in mental health care is the ability to develop personalized treatment plans. Each individual experiences mental health disorders differently, and AI has the capability to tailor interventions based on a person's unique needs and patterns^[38]. By continuously analyzing patient data, including treatment responses, lifestyle factors, and co-occurring conditions, AI can recommend the most effective therapies for each individual. For instance, AI can suggest a combination of psychotherapy and medication that has been shown to work best for a specific patient based on their history and characteristics, improving the likelihood of a successful outcome^[39].

Personalization goes beyond treatment recommendations; AI can also help to monitor patient progress in real time. Using data from wearable devices, mental health apps, and routine assessments, AI can track changes in a patient's behavior, emotional state, and overall well-being^[40]. If a patient shows signs of deteriorating mental health, AI can alert healthcare

providers to adjust treatment plans before the situation becomes critical. This proactive approach ensures that interventions are more responsive to patient needs, ultimately leading to better adherence to treatment protocols and improved mental health outcomes^[38].

3.3 Barriers to Implementation

The implementation of AI in mental health diagnostics faces several significant barriers, particularly in low-resource settings. One of the primary challenges is the lack of data infrastructure. AI models require vast amounts of high-quality data to function effectively, and many resource-limited environments do not have the necessary systems in place to collect, store, and analyze such data. Furthermore, data privacy concerns and regulations, such as the protection of sensitive mental health information, pose additional hurdles to the widespread use of AI in this field^[41].

In addition to technical barriers, there are also ethical and cultural challenges associated with AI in mental health care. Mental health diagnoses often involve deeply personal and subjective experiences, which may not be easily captured or understood by AI systems^[42]. Patients in low-resource environments may also be less willing to trust AI-driven interventions due to concerns about the accuracy of machine-generated diagnoses or the fear of being misunderstood by a system that cannot fully appreciate the nuances of human emotions. Overcoming these barriers requires not only improved access to data and technological infrastructure but also cultural adaptation and patient education to ensure that AI is used in a way that respects individual privacy and fosters trust in the healthcare system^[43].

4. AI and chronic disease management

4.1 Predictive analytics for disease progression

AI-driven predictive analytics plays a transformative role in the management of chronic diseases such as diabetes, hypertension, and heart disease. By analyzing vast amounts of patient data, including medical history, lifestyle factors, genetic predispositions, and real-time health metrics, AI models can forecast the progression of these diseases with remarkable precision^[44]. For example, AI can identify early signs of complications in patients with diabetes, such as diabetic retinopathy or neuropathy, before they become clinically apparent. This early detection allows for proactive management, reducing the likelihood of severe complications and improving long-term health outcomes^[45].

Moreover, AI models can track disease progression over time, helping healthcare providers identify trends and adjust treatment plans accordingly. For conditions like hypertension, AI algorithms can analyze blood pressure data in combination with other health indicators to predict when a patient may experience an exacerbation or a crisis event, such as a stroke^[46]. This predictive capability enables clinicians to intervene early, tailoring treatments to the patient's evolving condition and preventing costly and potentially life-threatening complications. As AI systems learn from ongoing patient data, they continuously refine their predictions, leading to more accurate forecasting and improved management of chronic diseases^[47].

4.2 Personalized treatment protocols

AI's ability to integrate diverse data sources is essential in developing personalized treatment protocols for chronic disease management. Traditional treatment regimens often

follow a one-size-fits-all approach, but with AI, healthcare providers can design individualized strategies based on each patient's unique medical profile. AI systems can analyze factors such as age, comorbidities, genetic makeup, lifestyle choices, and responses to previous treatments to recommend the most effective course of action. This personalized approach not only improves the likelihood of positive health outcomes but also reduces the trial-and-error period typically associated with finding the right treatment plan for chronic conditions ^[48].

For example, AI can optimize medication management for patients with heart disease by analyzing their response to various drugs, predicting potential drug interactions, and recommending the most effective medications based on individual needs ^[49]. Similarly, in managing diabetes, AI can suggest personalized dietary plans and exercise regimens, taking into account the patient's glucose levels, insulin sensitivity, and preferences. By continuously monitoring a patient's response to treatment and making real-time adjustments, AI can ensure that the treatment plan evolves alongside the patient's condition, leading to more effective disease management and improved quality of life ^[50].

4.3 Resource-limited setting applications

In resource-limited settings, where access to healthcare professionals, advanced diagnostic tools, and continuous monitoring systems is often scarce, AI can serve as a valuable tool in chronic disease management ^[51]. AI-driven mobile applications, telemedicine platforms, and wearable devices can enable remote monitoring of patients with chronic conditions, providing healthcare providers with real-time data and alerts about changes in a patient's health. These systems reduce the need for frequent in-person visits, which can be logistically challenging in rural or underserved areas, while also ensuring that patients receive timely interventions when necessary ^[52].

Moreover, AI can help bridge the knowledge gap in regions with a shortage of specialized healthcare professionals. For instance, AI algorithms can assist community health workers or general practitioners in diagnosing and managing chronic conditions by providing decision support based on up-to-date guidelines and patient data. In settings where healthcare resources are stretched thin, AI can augment the capacity of the existing workforce, enabling better management of chronic diseases across larger patient populations ^[53]. This can lead to more equitable healthcare delivery, ensuring that individuals in low-resource environments receive the same level of care and attention as those in more affluent areas. However, for AI to be fully effective in these contexts, it must be adapted to local needs, including language, cultural factors, and access to technology, ensuring that it is both practical and accessible to all patients ^[54].

5. Conclusion and future directions

This paper highlights the transformative potential of AI and machine learning in improving healthcare diagnostics and treatment plans, particularly in the areas of radiology, mental health, and chronic disease management. In radiology, AI enhances diagnostic accuracy by detecting subtle anomalies in medical images, which improves early detection and reduces human error. In mental health care, AI-driven predictive models enable the identification of at-risk individuals and allow for more personalized treatment plans, improving outcomes and reducing the severity of disorders.

In chronic disease management, AI's predictive analytics help forecast disease progression, and personalized treatment protocols ensure that patients receive the most effective care tailored to their needs. The application of AI in these areas not only increases efficiency but also enhances patient care by providing more accurate, timely, and personalized interventions, making it a vital tool in the healthcare sector.

AI solutions offer significant promise in resource-limited settings, where traditional healthcare infrastructure may be lacking. The scalability of AI technologies, such as mobile applications, wearable devices, and telemedicine platforms, can bridge gaps in healthcare access, enabling remote diagnostics and continuous monitoring for patients in underserved regions. By automating tasks like image analysis, predictive modeling, and treatment personalization, AI can compensate for shortages in skilled healthcare professionals and reduce the strain on existing resources. Moreover, AI's ability to analyze data from a variety of sources, including low-cost sensors and mobile phones, ensures that even communities with limited access to advanced medical equipment can benefit from enhanced healthcare. In such settings, AI has the potential to level the playing field, providing equitable healthcare access to populations that might otherwise be overlooked.

As AI continues to evolve, several areas require further research to optimize its integration with healthcare systems. One key area is the development of AI models that can learn from smaller datasets, which is particularly important in resource-limited environments where large-scale data collection may not be feasible. Additionally, the combination of AI with emerging technologies such as blockchain and IoT could further enhance healthcare optimization. Blockchain, for example, could improve data security and privacy in AI-driven healthcare systems, while IoT devices could provide real-time data for continuous monitoring of patients with chronic diseases. Furthermore, interdisciplinary research combining AI with fields such as genomics, digital therapeutics, and personalized medicine holds the potential to advance precision healthcare significantly. Future investigations should also focus on ethical considerations, such as algorithmic bias and patient consent, to ensure that AI solutions are fair, transparent, and universally applicable. These directions will help unlock the full potential of AI in healthcare, ensuring its effective, ethical, and widespread adoption.

6. References

1. Abisoye A, Akerele JI. A high-impact data-driven decision-making model for integrating cutting-edge cybersecurity strategies into public policy, governance, and organizational frameworks.
2. Adekunle BI, Chukwuma-Eke EC, Balogun ED, Ogunsola KO. A predictive modeling approach to optimizing business operations: a case study on reducing operational inefficiencies through machine learning.
3. Ewim CP-M, Omokhoa HE, Ogundejì IA, Ibeh AI. Future of work in banking: Adapting workforce skills to digital transformation challenges. *Future*. 2021;2(1).
4. Ogunsola KO, Balogun ED, Ogunmokin AS. Enhancing financial integrity through an advanced internal audit risk assessment and governance model. 2021.
5. Tomoh BO, Mustapha AY, Mbata AO, Kelvin-Agwu MC, Forkuo AY, Kolawole TO. Assessing the impact of telehealth interventions on rural healthcare accessibility:

- a quantitative study.
6. Egbuhuzor NS, Ajayi AJ, Akhigbe EE, Agbede O, Ewim C, Ajiga D. Cloud-based CRM systems: revolutionizing customer engagement in the financial sector with artificial intelligence. *Int J Sci Res Arch*. 2021;3(1):215-234.
 7. Adelodun MO, Anyanwu EC. Evaluating the environmental impact of innovative radiation therapy techniques in cancer treatment.
 8. Afolabi AI, Chukwurah N, Abieba OA. Implementing cutting-edge software engineering practices for cross-functional team success.
 9. Abisoye A, Akerele JI. A practical framework for advancing cybersecurity, artificial intelligence and technological ecosystems to support regional economic development and innovation. *Int J Multidiscip Res Growth Eval*. 2022;3(1):700-713.
 10. Achumie GO, Oyegbade IK, Igwe AN, Ofodile OC, Azubuike C. A conceptual model for reducing occupational exposure risks in high-risk manufacturing and petrochemical industries through industrial hygiene practices. 2022.
 11. Fiemotongha JE, Igwe AN, Ewim CP-M, Onukwulu EC. *International Journal of Management and Organizational Research*. 2023.
 12. Isibor NJ, Ibeh AI, Ewim CP-M, Sam-Bulya NJ, Martha E. A financial control and performance management framework for SMEs: strengthening budgeting, risk mitigation, and profitability. 2022.
 13. Ewim CP-M, Azubuike C, Ajani OB, Oyeniyi LD, Adewale TT. Incorporating climate risk into financial strategies: sustainable solutions for resilient banking systems. 2023.
 14. Hassan YG, Collins A, Babatunde GO, Alabi AA, Mustapha SD. Blockchain and zero-trust identity management system for smart cities and IoT networks. *Int J Multidiscip Res Growth Eval*. 2023;4(1):704-709.
 15. Kamau E, Myllynen T, Collins A, Babatunde GO, Alabi AA. Advances in full-stack development frameworks: a comprehensive review of security and compliance models. 2023.
 16. Fiemotongha JE, Igwe AN, Ewim CP-M, Onukwulu EC. Innovative trading strategies for optimizing profitability and reducing risk in global oil and gas markets. *J Adv Multidiscip Res*. 2023;2(1):48-65.
 17. Hassan YG, Collins A, Babatunde GO, Alabi AA, Mustapha SD. Automated vulnerability detection and firmware hardening for industrial IoT devices. *Int J Multidiscip Res Growth Eval*. 2023;4(1):697-703.
 18. Kolawole TO, Mustapha AY, Mbata AO, Tomoh BO, Forkuo AY, Kelvin-Agwu MC. Evaluating the effectiveness of community-based health education programs in preventing non-communicable diseases. 2023.
 19. Kolawole TO, Mustapha AY, Mbata AO, Tomoh BO, Forkuo AY, Kelvin-Agwu MC. Innovative strategies for reducing antimicrobial resistance: a review of global policy and practice. 2023.
 20. Hassan YG, Collins A, Babatunde GO, Alabi AA, Mustapha SD. AI-powered cyber-physical security framework for critical industrial IoT systems. *Mach Learn*. 2023:27.
 21. Kelvin-Agwu MC, Mustapha AY, Mbata AO, Tomoh BO, Yeboah A, Forkuo TOK. A policy framework for strengthening public health surveillance systems in emerging economies. 2023.
 22. Ogbuagu OO, Mbata AO, Balogun OD, Oladapo O, Ojo OO, Muonde M. Artificial intelligence in clinical pharmacy: enhancing drug safety, adherence, and patient-centered care. [Journal name missing]. 2023.
 23. Ogbuagu OO, Mbata AO, Balogun OD, Oladapo O, Ojo OO, Muonde M. Quality assurance in pharmaceutical manufacturing: bridging the gap between regulations, supply chain, and innovations. [Journal name missing]. 2023.
 24. Ojadi JO, Onukwulu E, Odionu C, Owulade O. AI-driven predictive analytics for carbon emission reduction in industrial manufacturing: a machine learning approach to sustainable production. *Int J Multidiscip Res Growth Eval*. 2023;4(1):948-960. doi:10.54660/IJMRGE.2023.4.1.948-960.
 25. Ojadi JO, Onukwulu E, Odionu C, Owulade O. Leveraging IoT and deep learning for real-time carbon footprint monitoring and optimization in smart cities and industrial zones. *IRE J*. 2023;6(11):946-964.
 26. Onukwulu EC, Fiemotongha JE, Igwe AN, Ewim CP-M. Transforming supply chain logistics in oil and gas: best practices for optimizing efficiency and reducing operational costs. *J Adv Multidiscip Res*. 2023;2(2):59-76.
 27. Onukwulu EC, Fiemotongha JE, Igwe AN, Paul-Mikki C. The Role of Blockchain and AI in the Future of Energy Trading: A Technological Perspective on Transforming the Oil & Gas Industry by 2025. *Methodology*. 2023:173.
 28. Oteri OJ, Onukwulu EC, Igwe AN, Ewim CP-M, Ibeh AI, Sobowale A. Artificial Intelligence in Product Pricing and Revenue Optimization: Leveraging Data-Driven Decision-Making. 2023.
 29. Oteri OJ, Onukwulu EC, Igwe AN, Ewim CP-M, Ibeh AI, Sobowale A. Cost Optimization in Logistics Product Management: Strategies for Operational Efficiency and Profitability. 2023.
 30. Oteri OJ, Onukwulu EC, Igwe AN, Ewim CP-M, Ibeh AI, Sobowale A. Dynamic Pricing Models for Logistics Product Management: Balancing Cost Efficiency and Market Demands. 2023.
 31. Soyege OS, *et al*. Evaluating the impact of health informatics on patient care and outcomes: A detailed review.
 32. Soyege OS, *et al*. Health informatics in developing countries: Challenges and opportunities.
 33. Nwokedi CN, *et al*. Addressing healthcare disparities: Tackling socioeconomic and racial inequities in access to medical services.
 34. Olowe KJ, Edoh NL, Zouo SJC, Olamijuwon J. Review of predictive modeling and machine learning applications in financial service analysis.
 35. Paramasivan A. AI and Behavioral Health: Predicting and Managing Mental Illnesses with Data-Driven Solutions. *Int J AI BigData Comput Manag Stud*. 2020;1(1):21-30.
 36. Katiyar K. AI-based predictive analytics for patients' psychological disorder. In: *Predictive Analytics of Psychological Disorders in Healthcare: Data Analytics on Psychological Disorders*. Springer; 2022. p. 37-53.
 37. Abd-Alrazaq A, *et al*. The performance of artificial intelligence-driven technologies in diagnosing mental

- disorders: an umbrella review. *NPJ Digit Med.* 2022;5(1):87.
38. Chung J, Teo J. Mental health prediction using machine learning: taxonomy, applications, and challenges. *Appl Comput Intell Soft Comput.* 2022;2022(1):9970363.
 39. Rosenfeld A, *et al.* Big data analytics and AI in mental healthcare. *arXiv Prepr arXiv:1903.12071.* 2019.
 40. Osman AB, *et al.* Examining mental disorder/psychological chaos through various ML and DL techniques: A critical review. *Ann Emerg Technol Comput (AETiC).* 2022;6(2):61–70.
 41. Ciecierski-Holmes T, Singh R, Axt M, Brenner S, Barteit S. Artificial intelligence for strengthening healthcare systems in low-and middle-income countries: a systematic scoping review. *NPJ Digit Med.* 2022;5(1):162.
 42. Lamichhane B, Neupane N. Improved healthcare access in low-resource regions: A review of technological solutions. *arXiv Prepr arXiv:2205.10913.* 2022.
 43. Khan M, Khurshid M, Vatsa M, Singh R, Duggal M, Singh K. On AI approaches for promoting maternal and neonatal health in low resource settings: a review. *Front Public Health.* 2022;10:880034.
 44. Aldhaheeri F. Patient-Centric AI in Healthcare: Addressing Apprehensions and Enhancing Chronic Disease Management. 2021.
 45. Aslam M. Artificial Neural Networks and AI: Advancing the Management of Chronic Diseases in Healthcare. 2020.
 46. Bi WL, *et al.* Artificial intelligence in cancer imaging: clinical challenges and applications. *CA Cancer J Clin.* 2019;69(2):127–57.
 47. Lu Y. Artificial intelligence: a survey on evolution, models, applications and future trends. *J Manag Anal.* 2019;6(1):1–29.
 48. Subramanian M, *et al.* Precision medicine in the era of artificial intelligence: implications in chronic disease management. *J Transl Med.* 2020;18:1–12.
 49. Cesario A, *et al.* The role of artificial intelligence in managing multimorbidity and cancer. *J Pers Med.* 2021;11(4):314.
 50. Ahmed Z, Mohamed K, Zeeshan S, Dong X. Artificial intelligence with multi-functional machine learning platform development for better healthcare and precision medicine. *Database (Oxford).* 2020;2020:baaa010.
 51. Diaz JV, Riviello ED, Papali A, Adhikari NK, Ferreira JC. Global critical care: moving forward in resource-limited settings. *Ann Glob Health.* 2019;85(1):3.
 52. Heidt B, *et al.* Point of care diagnostics in resource-limited settings: A review of the present and future of PoC in its most needed environment. *Biosensors.* 2020;10(10):133.
 53. Peeling RW, McNerney R. Emerging technologies in point-of-care molecular diagnostics for resource-limited settings. *Expert Rev Mol Diagn.* 2014;14(5):525–34.
 54. Wang S, Lifson MA, Inci F, Liang L-G, Sheng Y-F, Demirci U. Advances in addressing technical challenges of point-of-care diagnostics in resource-limited settings. *Expert Rev Mol Diagn.* 2016;16(4):449–59.