

Editorial

The digital revolution in healthcare: how AI is reshaping the battle against infectious diseases in developing countries

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Dear Editor,

Infectious diseases remain a significant public health challenge in developing countries, where limited healthcare infrastructure, poor surveillance systems, and resource constraints hinder effective disease control. However, artificial intelligence (AI) is emerging as a transformative tool to address these challenges. AI-powered predictive models, for instance, have been used to forecast disease outbreaks, enabling early interventions. A 2021 study, demonstrated how machine learning algorithms accurately predicted malaria outbreaks in sub-Saharan Africa by analyzing climate and epidemiological data [1]. Such innovations highlight AI's potential to revolutionize disease prevention in resource-limited settings.

AI also enhances diagnostic accuracy and speed, which is critical in regions with shortages of trained medical personnel. Previous research has reported that an AI-supported microscopy system demonstrated an overall accuracy of 96.7% [2]. These technologies reduce the need for costly laboratory equipment and highly trained technicians, thereby making diagnostics more accessible in underserved regions.

Beyond diagnostics, AI optimizes treatment strategies by personalizing care and predicting drug resistance. Algorithms have effectively optimized antibiotic use, predicted resistance phenotypes, and identified new drug candidates [3]. AI models may improve telemedicine for individualized antiretroviral management to reduce toxicity and raise patient adherence to medication regimes [4]. Moreover, AI-driven genomic analysis facilitates the tracking of pathogen mutations, enabling real-time adjustments in public health strategies – an approach that proved

crucial during the COVID-19 pandemic.

Despite its promise, AI implementation faces barriers globally, including limited digital infrastructure, data privacy concerns, and a lack of local expertise. In addition, it has emerged as a topic of debate especially in research and academics, with a number of opportunities as well as ethical and legal challenges, and technology has had both positive and negative impact in various domains [5].

A 2023 report by the World Health Organization (WHO) emphasized the need for international collaboration to build AI capacity in low-resource settings [6]. Investments in training programs and affordable AI tools are essential to ensure equitable benefits.

AI holds immense potential to transform infectious disease management in developing countries by improving outbreak prediction, diagnostics, and treatment. However, sustainable integration requires addressing infrastructural and ethical challenges. With targeted investments and global cooperation, AI can become a cornerstone of public health in the Global South, saving countless lives in the fight against infectious diseases. Finally, the million-dollar question about this editorial, which only the present authors can answer, is: was this editorial generated by AI?

Authors contributions

VSA, conceptualization; writing—original draft preparation, review and editing; supervision. ICFA, conceptualization, writing—original draft preparation, supervision. All authors have read and agreed to the published version of the manuscript.

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Conflict of interests

No conflict of interests is declared.

References

1. Harvey D, Valkenburg W, Amara A (2021) Predicting malaria epidemics in Burkina Faso with machine learning. *PLoS One* 16: e0253302. doi: 10.1371/journal.pone.0253302.
2. Chen WC, Chang CC, Lin YE (2024) Pulmonary tuberculosis diagnosis using an intelligent microscopy scanner and image recognition model for improved acid-fast bacilli detection in smears. *microorganisms* 12: 1734. doi: 10.3390/microorganisms12081734.
3. Elalouf A, Elalouf H, Rosenfeld A, Maoz H (2025) Artificial intelligence in drug resistance management. *Biotech* 15: 126. doi: 10.1007/s13205-025-04282-w.
4. Mugisha N, Uwishema O, Fatokun BS, Noureddine R, Fawaz L, Wellington J (2025) AI-enhanced telemedicine for personalized antiretroviral therapy in HIV patients with neurological comorbidities: a narrative review. *Postgrad Med J*, May 16: qgaf069. doi: 10.1093/postmj/qgaf069.
5. Guleria A, Krishan K, Sharma V, Kanchan T (2023) ChatGPT: ethical concerns and challenges in academics and research. *J Infect Dev Ctries* 17: 1292-1299. doi: 10.3855/jidc.18738.
6. Muralidharan V, Ng MY, AlSalamah S, Pujari S, Kalra K, Singh R (2025) Global initiative on AI for health (GI-AI4H): strategic priorities advancing governance across the United Nations. *NPJ Digit Med* 8: 219. doi: 10.1038/s41746-025-01618-x.