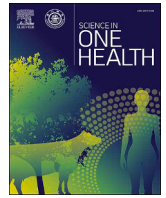


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## Perspectives

## AI tools accelerating One Health advancement: insights from the Global Public Health Week 2025 Webinar



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## ABSTRACT

This commentary emerges from a webinar titled “AI Tools Accelerating One Health Advancement for a Public Health Perspective,” held on World Health Day 2025. The event convened global experts to explore how artificial intelligence (AI) reshapes One Health initiatives. Key discussions addressed AI applications in data integration, risk assessment, and real-time public health responses. Major outcomes included strategies for incorporating AI into public health research, fostering multi-sectoral partnerships, addressing ethical and privacy concerns, and improving AI literacy. This commentary proposes six core recommendations: (1) establish robust governance frameworks; (2) develop a global AI ethics charter; (3) mandate transparency in training data and algorithms; (4) expand open-data access and AI literacy programs; (5) create interdisciplinary One Health innovation hubs; and (6) ensure AI solutions are both cutting-edge and equitable. These proposals aim to guide responsible and inclusive AI implementation to safeguard human, animal, and environmental health.

**Abbreviations:** AI, artificial intelligence; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; LMICs, low- and middle-income countries; WFPHA, World Federation of Public Health Associations; OHWG, One Health Working Group; CPMA, Chinese Preventive Medicine Association; AMR, antimicrobial resistance; HIPAA, Health Insurance Portability and Accountability Act; GDPR, General Data Protection Regulation; WHO, World Health Organization; GDP, Gross Domestic Product; API, application programming interface.

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1. Introduction

The One Health approach recognizes the interdependence of human, animal and environmental health [1]. This paradigm shift has gained global traction in response to accelerating challenges such as climate change, urbanization, and the rise of zoonotic diseases, including diseases caused by Ebola, Zika, and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) viruses. Though systematic data resources and cross-sectoral evidence remain limited, we still can see a clear shift as global health actors increasingly embed artificial intelligence (AI) into their core strategies for public health and One Health, signaling both market growth and rising research interest. For example, The Global Fund to Fight AIDS, Tuberculosis and Malaria is scaling digital and AI tools such as tuberculosis screening and health system accelerators [2]; the United Nations are setting global standards and piloting AI in One Health and pandemic preparedness [3]; and the Gates Foundation is funding equity-focused innovations, from local low- and middle-income countries (LMICs) research projects to AI-assisted diagnostics [4]. More broadly, AI is revolutionizing public health through drug discovery [5], diagnostics [6], and clinical decision-making advancements [7]. By integrating heterogeneous data, such as human healthcare records, veterinary surveillance data, environmental metrics and socio-economic indicators [8], AI offers innovative solutions for

disease surveillance, predictive analytics, environmental monitoring, and enhanced decision-making across the One Health spectrum [9] (Fig. 1, for data of literature review on AI in One Health see Appendix A).

On 7 April 2025, the World Federation of Public Health Associations (WFPHA)–One Health Working Group (OHWG) and the Chinese Preventive Medicine Association (CPMA) co-hosted a webinar entitled “AI Tools Accelerating One Health Advancement for a Public Health Perspective.” The two-hour virtual session brought together 13 global experts and featured five keynote presentations and a panel discussion (see the names of participants listed in Appendix B and webinar agenda in Appendix C). The dialogue centered on the integration of AI in One Health frameworks, with emphasis on data synthesis, risk forecasting, ethical governance, and capacity building. The following sections summarize four major themes and two illustrative case studies, culminating in a set of actionable recommendations.

2. Key themes

2.1. AI in public health research

Prof. Huaiyu Tian presented predictive models for dengue outbreaks based on climate indices such as the Indian Ocean Basin Index, capable of forecasting risk up to nine months in advance. His team also utilized

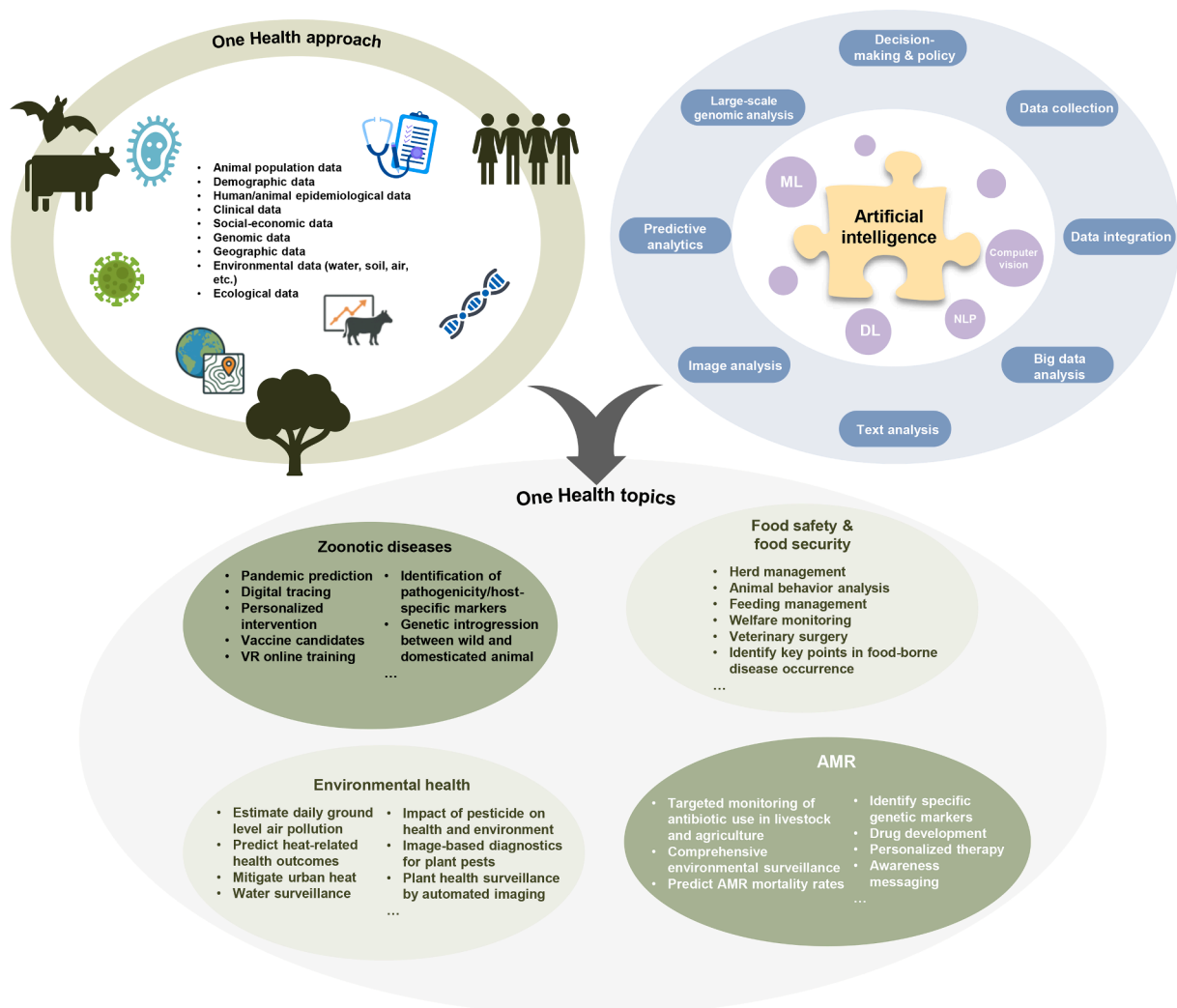


Fig. 1. Artificial intelligence's application in One Health issues. Abbreviations: ML, machine learning; DL, deep learning; NLP, natural language processing; VR, virtual reality; AMR, antimicrobial resistance.

AI systems to guide local governments in managing rodent populations and mitigating zoonotic spillover, underscoring the need for interdisciplinary data integration.

Dr. Issam Bennis demonstrated the use of generative AI tools like GPT-4.5 and Gemini 2.5 Pro in automating systematic reviews. These tools streamline literature search strategies, protocol drafting, and data extraction [10], significantly reducing the time burden. Platforms such as Semantic Scholar and Deep Review were highlighted for their capacity to uncover niche studies, although transparency and methodological rigor remain essential.

## 2.2. Collaborative frameworks

Multi-sectoral partnerships are critical for scalable AI deployment. In Lao PDR, the shift from mass drug administration to a unified One Health model integrated human health, animal surveillance, and environmental data into a singular AI platform. Speakers emphasized the necessity of open-data policies and interoperability to enhance global cooperation.

## 2.3. Ethical governance

Prof. Md. Tanvir Rahman discussed the ethical dimensions of AI in antimicrobial resistance (AMR) research, highlighting challenges related to patient data privacy, data quality, and equitable access. Citing regulatory frameworks like Health Insurance Portability and Accountability Act (HIPAA) and General Data Protection Regulation (GDPR), he underscored the need for cross-disciplinary collaboration to build ethical-legal structures capable of supporting complex public health initiatives.

## 2.4. AI education

Building AI literacy emerged as a clear priority for both professionals and students alike. This need was exemplified in Eastern and Southern Africa, where a multi-country project led by Prof. Lee Willingham successfully trained veterinary, medical, and social science students. These students collaborated to address zoonotic disease risks, effectively utilizing AI tools in their work. Further illustrating this commitment, Dr. Khaja Mohteshamuddin detailed Department of Veterinary Medicine at UAE University's innovative "AI in Veterinary Medicine" course. Within this program, students employed deep learning tools to analyze crucial livestock health data originating from livestock farms. A significant partnership with Microsoft enhanced the learning experience, providing hands-on training with Azure AI. As a practical outcome, students will be able to develop applications capable of diagnosing animal diseases.

## 3. Case studies

### 3.1. China's interdisciplinary malaria elimination in Yunnan Province (2019)

Prof. Jiming Liu led a collaboration between computer scientists and parasitologists from Chinese Centers for Disease Control and Prevention targeting malaria in 20 counties near the Myanmar border. Using anonymized legacy data, the team identified transmission patterns and developed machine learning algorithms to infer diffusion networks based on daily case reports, climate data, and socio-economic variables. The models prioritized high-risk zones despite inconsistent data patterns and contributed to China's malaria elimination success. In this case, AI tools, particularly machine learning, enabled the integration of diverse data sources, such as climate and socio-economic variable, into predictive models, which supported evidence-based decision-making for malaria control in at-risk areas. Emphasis was placed on open-access technology and training workshops to promote global replication.

### 3.2. AI-powered surveillance of seasonal influenza in Brazil

A project led by the Evandro Chagas National Institute of Infectious Diseases, Oswaldo Cruz Foundation in Rio de Janeiro, combined horizon scanning and AI surveillance to model seasonal influenza outbreaks in South America. Influencing factors such as migration, urban mobility, vaccination coverage, and climate were aggregated for predictive modeling. A moving epidemic method, endorsed by the World Health Organization (WHO), was used to analyze influenza time-series data. Machine learning classifiers, including decision trees and random forests, were trained to predict influenza outbreak risks. Predictors such as air passenger volume, GDP per capita, and temperature showed significant importance. In South American datasets, the random forest model outperformed others in accuracy, precision, sensitivity, and specificity. An application programming interface (API) under validation allows data analysis and model export. The project highlighted interdisciplinary collaboration among AI experts, epidemiologists, and clinicians. And the AI-powered surveillance tools integrated in a public health system can analyze complex, multi-source data and predict zoonoses outbreaks and help regions to better response to global pandemics with a One Health approach.

## 4. Challenges and recommendations

Despite the potential of AI, several challenges remain. First, the vast amount of field-collected human–animal–environment data faces analytical bottlenecks, requiring AI-driven solutions for more efficient outbreak prediction. Second, to overcome integration barriers, domain-specific tools must be embedded into agent-based AI systems while combining data-driven technologies with established scientific models to address data gaps. Third, the lack of open-access databases highlights the urgent need for the development of transnational repositories with standardized quality controls. Finally, outdated methods based on statistical frameworks fail to establish causality in complex datasets, necessitating innovation in causal inference modeling.

To address these challenges, all experts in this webinar have agreed to offer following six key recommendations: (1) Establishing robust governance frameworks to guide ethical and effective AI deployment; (2) Develop a global AI ethics charter to define universal standards for responsible technology use; (3) Mandating transparency in training data and algorithmic logic to build trust and accountability; (4) Enhancing open-data access and capacity-building programs, particularly for underserved regions; (5) Create interdisciplinary One Health innovation hubs to foster sectoral collaboration; (6) Promote equitable, cutting-edge AI solutions that address the needs of human, animal, and environmental health collectively.

## 5. Conclusion

The 2025 World Health Day webinar illuminated AI's transformative role in advancing the One Health agenda. From forecasting dengue outbreaks to automating evidence synthesis, the showcased initiatives illustrate AI's potential to revolutionize public health. Crucially, the discussions underscored the importance of equitable AI literacy, ethical governance, and global collaboration. Case studies from China and Brazil illustrated how AI, when responsibly deployed, can strengthen disease surveillance and pandemic preparedness. As one speaker aptly concluded, "AI is not just a tool—it is a shared mission to ensure health for all." This commentary calls on stakeholders to prioritize inclusivity, transparency, and interdisciplinary cooperation in using AI to protect our interconnected world.

### CRedit authorship contribution statement

**Jingshu Liu:** Writing – review & editing, Writing – original draft, Validation. **Shenning Lu:** Writing – review & editing, Writing – original

draft, Validation. **Jiming Liu:** Writing – review & editing, Validation, Resources. **Huaiyu Tian:** Writing – review & editing, Validation, Resources. **Md. Tanvir Rahman:** Writing – review & editing, Validation, Resources. **Issam Bennis:** Writing – review & editing, Validation, Resources. **Somphou Sayasone:** Writing – review & editing, Validation, Resources. **Daniela Polessa:** Writing – review & editing, Validation, Resources. **Khaja Mohteshamuddin:** Writing – review & editing, Validation, Resources. **Quanle Li:** Writing – review & editing, Validation, Conceptualization. **Heya Yi:** Writing – review & editing, Validation, Conceptualization. **Mayumi Wakimoto:** Writing – review & editing, Validation, Resources. **Arve Lee Willingham:** Writing – review & editing, Validation, Conceptualization. **Raman Bedi:** Writing – review & editing, Validation, Conceptualization. **Xiao-Nong Zhou:** Writing – review & editing, Validation, Supervision, Conceptualization.

#### Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used DeepSeek in order to summarize speakers' content from long meeting notes. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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Xiao-Nong Zhou is the Editor-in-Chief of *Science in One Health*. Jiming Liu is the Deputy Editors-in-Chief of *Science in One Health*. Md. Tanvir Rahman, Somphou Sayasone, Arvee Lee Willingham are the Editorial Board Members of *Science in One Health*. Given their role as mentioned above, had no involvement in the peer review of this article and had no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to another journal editor. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.soh.2025.100127>.

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