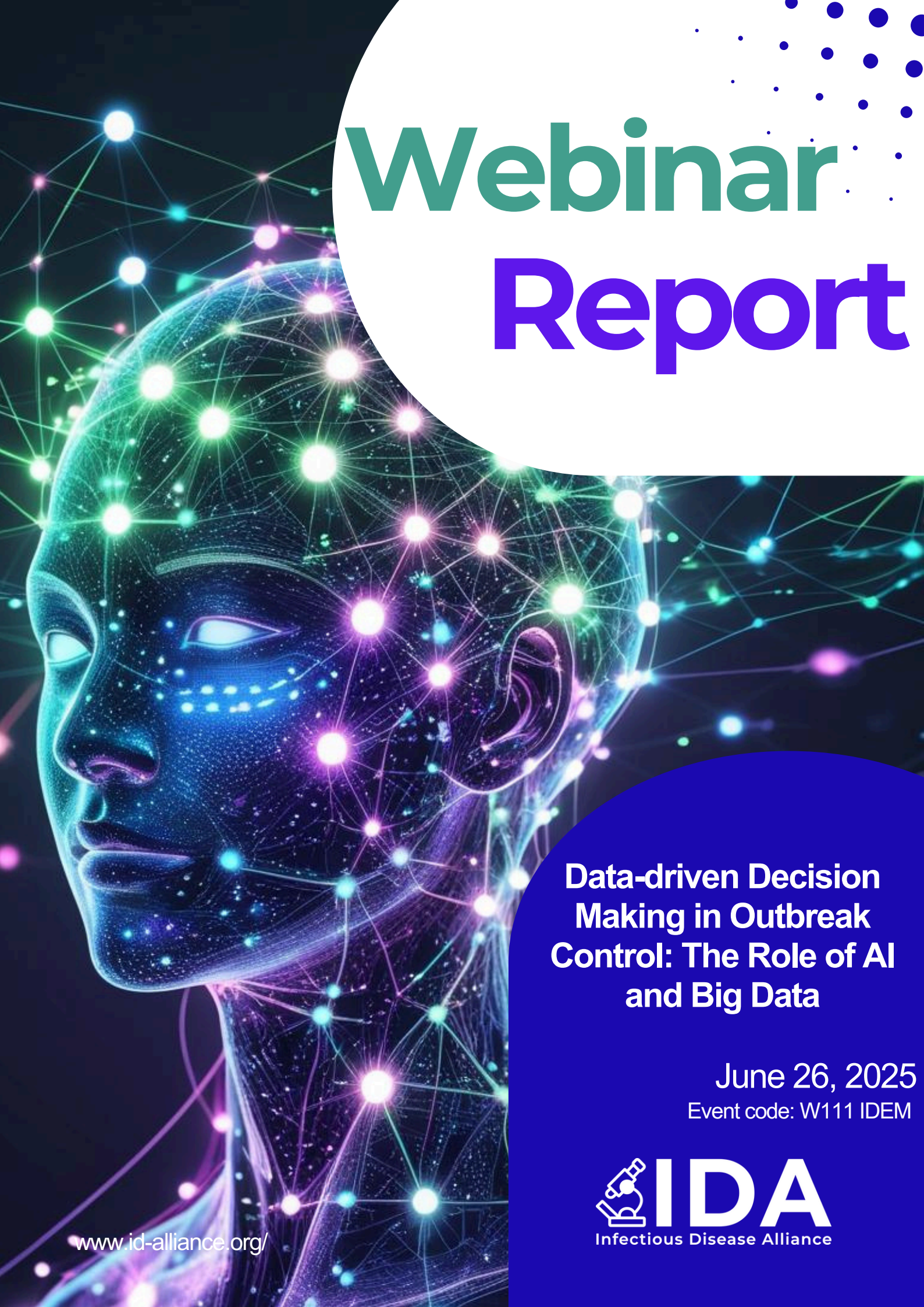


Webinar Report

Data-driven Decision Making in Outbreak Control: The Role of AI and Big Data

June 26, 2025

Event code: W111 IDEM

IDA
Infectious Disease Alliance

www.id-alliance.org/

About this report

This report presents the key findings and discussions from the webinar "Data-Driven Decision Making in Outbreak Control: The Role of AI and Big Data," organized by the Infectious Disease Alliance (IDA)'s Digital Health and Technology Committee on June 26, 2025. The event convened global health stakeholders, data scientists, and policymakers to explore the transformative potential of artificial intelligence (AI) and big data in enhancing outbreak preparedness, detection, and response.

The webinar underscored the urgent need to integrate real-time data into health crisis decision-making, aligning with global health policies on pandemic preparedness and technology-driven epidemic control. The dialogue generated a set of action-oriented recommendations, including:

- Promoting equitable data collection to address gaps and biases in AI models.
- Strengthening real-time surveillance systems through AI and big data integration.
- Advocating for ethical frameworks and policies to ensure responsible AI use.
- Fostering cross-sectoral partnerships to enhance global outbreak response.

This report is organized around the core themes of the webinar, offering a synthesis of presentations and evidence-based strategies. It aims to serve as a resource for stakeholders committed to equitable, data-driven public health systems worldwide.

This event report was compiled by:
Kossar Ghandehari, Digital Health and Technology Committee Manager, IDA

Introduction

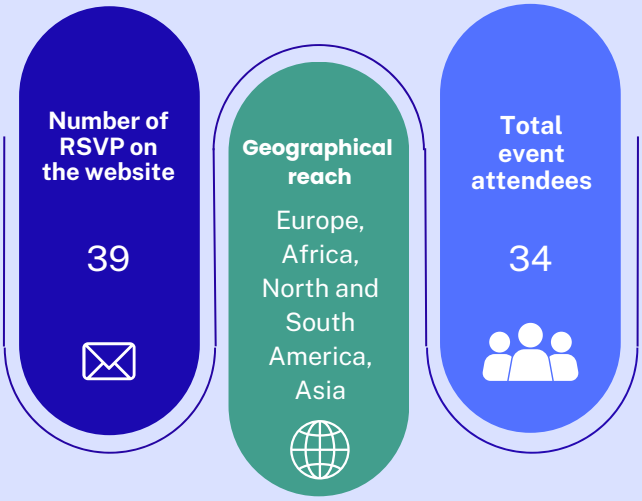
The Infectious Disease Alliance (IDA), through its Digital Health and Technology Committee, hosted a virtual webinar titled “Data-Driven Decision Making in Outbreak Control: The Role of AI and Big Data” on Thursday, June 26, 2025, at 4 p.m. CEST (10 a.m. EST) via Google Meet. This timely event brought together a diverse array of public health professionals, healthcare providers, AI and big data experts, NGOs, civil society organizations, and academics to discuss the critical role of digital innovation in global health resilience. The webinar served as a platform to emphasize AI and big data as powerful tools for real-time outbreak management, particularly for vulnerable populations in low- and middle-income countries, through a One Health approach.

Background on AI and Big Data in Outbreak Control

The rising frequency and complexity of infectious disease outbreaks highlight the need for innovative tools to enhance surveillance, prediction, and response. AI and big data enable real-time data analysis, predictive modeling, and contact tracing, facilitating faster and more effective interventions. However, challenges such as data gaps, biases, interoperability, privacy concerns, and limited infrastructure in low-resource settings persist. The webinar aimed to showcase cutting-edge applications, address these challenges, and foster collaboration to strengthen global health preparedness.

The objectives of the event

- Explore how **AI and big** data can **transform outbreak detection, monitoring, and response strategies.**
- Highlight **the role of real-time data analysis in improving decision-making** during health crises.
- Address challenges in **data integration, privacy, and technological barriers** in outbreak control.
- Facilitate **cross-sectoral dialogue** among data scientists, health professionals, and policymakers.
- Share successful **case studies of AI and big data applications** in past outbreak scenarios.



Summary & key takeaways of the webinar

Topic: Addressing Data Gaps and Biases in AI Models for Equitable Outbreak Control in Africa: Insights from eHealth Africa's Data Collection and Community Engagement Strategies

Audrey Odogu shared how her team uses community-driven data to make AI tools fairer. She introduced LoMIS, a tool that cut vaccine stock-outs by 33% in Kano, Nigeria, during COVID-19. Using the Ebola outbreak in Nigeria as an example, she showed how SMS tools and AI-powered contact tracing boosted community trust and results. Odogu stressed using fair, inclusive, and transparent AI to ensure everyone benefits.

Key Takeaways:

- Community-based data collection and GIS mapping bridge geographical and cultural data gaps.
- Tools like LoMIS demonstrate the power of technology in optimizing healthcare logistics.
- Responsible AI ensures equitable health outcomes by prioritizing inclusivity and transparency.

Dr. Nahid Bhadelia

Founding Director of Boston University's Center on Emerging Infectious Diseases, Founding Director and co-founder of Biothreats Emergence, Analysis and Communications Network (BEACON)

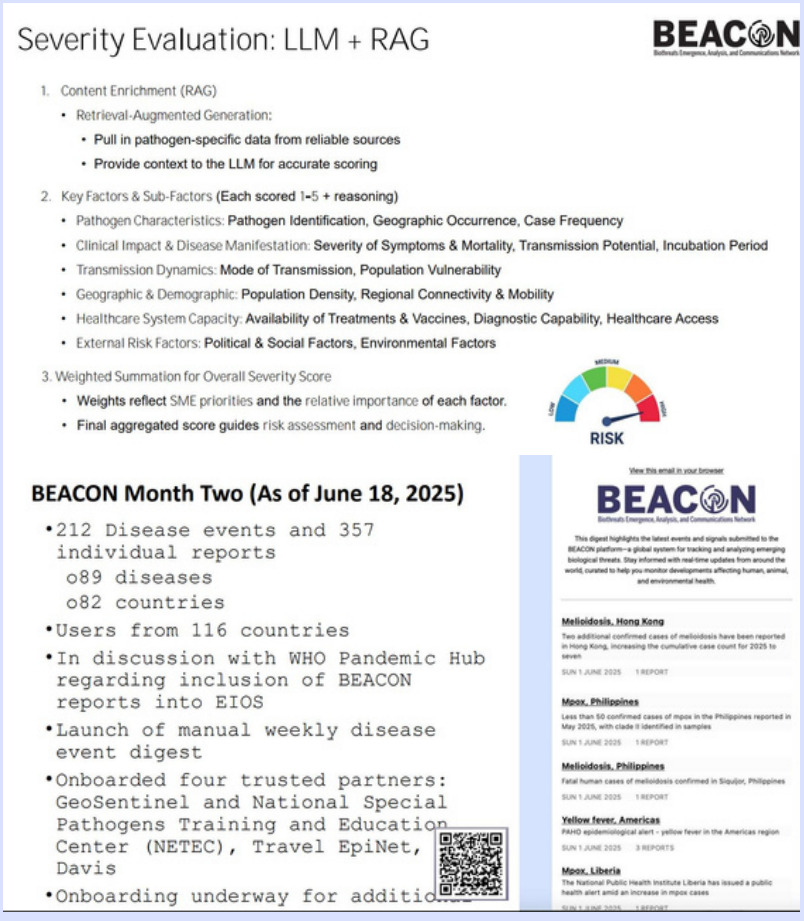
Dr. Nahid Bhadelia is the founding director of Boston University's Center on Emerging Infectious Diseases and an Associate Professor at BU School of Medicine. A board-certified infectious diseases physician, she served as Senior Policy Advisor for the White House COVID-19 Response Team (2022–2023), coordinating global vaccine donations and leading Project NextGen. She co-founded BEACON, an open-source outbreak surveillance program, and researches global health security, pandemic preparedness, and infection control.

Topic: Biothreats Emergence, Analysis, and Communications Network (BEACON)

Dr. Bhadelia presented BEACON's open-source, near real-time event-based surveillance platform. Powered by a large language model (LLM) trained on 5.7 billion tokens, BEACON processes signals from web scraping, public health reports, and academic partnerships, with human-in-the-loop verification to ensure accuracy. Since its launch in May 2025, BEACON has reported 212 outbreaks across 89 diseases and 82 countries, focusing on contextualized reporting for clinicians, policymakers, and communities.

Key Takeaways:

- BEACON's LLM enhances signal detection and reduces human workload while maintaining transparency.
- Open-source platforms democratize access to critical outbreak information.
- Global expert networks and partnerships provide context for effective decision-making.



Dr. Catherine Bielick

Infectious Disease Physician at Beth Israel Deaconess Medical Center, Clinical Instructor at Harvard Medical School

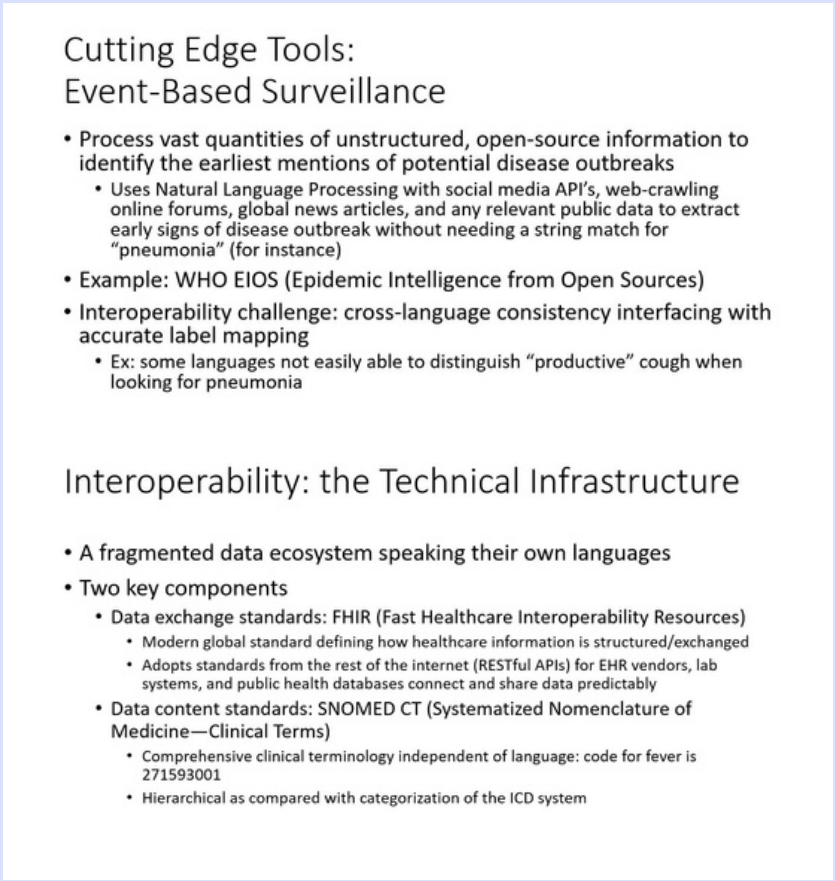
Dr. Catherine Bielick is an infectious disease physician at Beth Israel Deaconess Medical Center and Clinical Instructor at Harvard Medical School. With a Master's in Data Science, she develops AI-driven approaches for HIV care and population health surveillance. Her research focuses on global health data systems, AI bias, and equitable implementation, advocating for AI to reduce health disparities and enhance clinical decision-making.

Topic: Cutting-edge tools for outbreak detection and challenges such as data interoperability and international collaboration

Dr. Bielick provided a high-level overview of cutting-edge tools for outbreak detection. These include event-based surveillance (e.g., EIOS), digital exhaust (e.g., search queries, wearable data), pathogen genomics (e.g., GISAID, Nextstrain), and environmental monitoring (e.g., wastewater surveillance). She highlighted challenges such as cross-language consistency, data interoperability, and privacy concerns, proposing solutions like federated learning and standardized data models (e.g., FHIR, SNOMED CT). Dr. Bielick noted the WHO's May 2025 pandemic agreement as a step toward equitable data sharing.

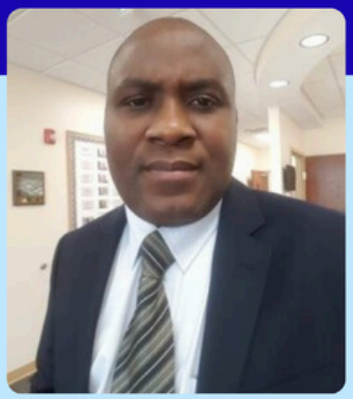
Key Takeaways:

- Advanced tools like genomic sequencing and wastewater surveillance enable real-time outbreak detection.
- Interoperability challenges require standardized data exchange and federated learning systems.
- Clinicians must advocate for equitable, interoperable systems to support global collaboration.



Prof. Ernest Tambo

MPH, Implementation & MERL specialist at the University of Global Health Equity (UGHE), Associate Professor



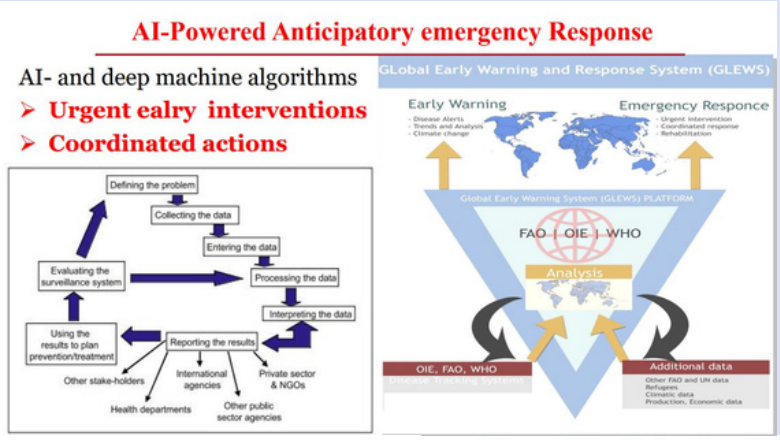
Prof. Ernest Tambo is a Public Health Expert and MERL Specialist at the University of Global Health Equity, advancing evidence-based decision-making and community care equity. With a Doctorate in Pharmacology and postdoctorates from University of Pretoria and China CDC, he specializes in digital surveillance for outbreak response (e.g., Ebola, Mpox). He has worked in 47 countries, published over 110 peer-reviewed works, and contributed to health policy and curriculum development.

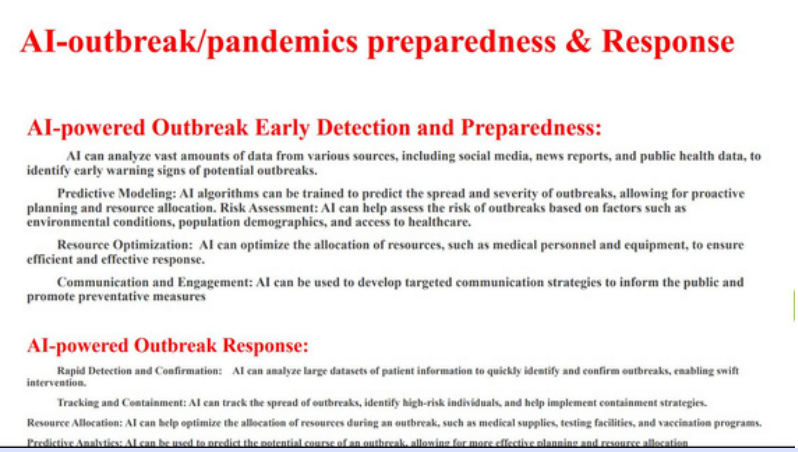
Topic: AI-Powered Outbreak Preparedness, Response and Prediction Capabilities in global south :Insights and challenges

Prof. Tambo explored AI's transformative potential in the Global South, citing Rwanda's rapid response to the 2025 Marburg outbreak as a success story. He discussed AI applications in predictive modeling, contact tracing, and genomic surveillance, emphasizing the need for capacity building, ethical frameworks, and infrastructure to overcome barriers like low internet penetration and high data costs. Prof. Tambo called for global partnerships to ensure equitable AI adoption and effective outbreak response.

Key Takeaways:

- AI-driven tools, as seen in Rwanda's Marburg response, enhance early detection and intervention.
- Infrastructure and regulatory gaps in the Global South limit AI's scalability.
- Ethical AI use and stakeholder engagement are essential for equitable health outcomes.





AI-outbreak/pandemics preparedness & Response

AI-powered Outbreak Early Detection and Preparedness:

AI can analyze vast amounts of data from various sources, including social media, news reports, and public health data, to identify early warning signs of potential outbreaks.

Predictive Modeling: AI algorithms can be trained to predict the spread and severity of outbreaks, allowing for proactive planning and resource allocation. Risk Assessment: AI can help assess the risk of outbreaks based on factors such as environmental conditions, population demographics, and access to healthcare.

Resource Optimization: AI can optimize the allocation of resources, such as medical personnel and equipment, to ensure efficient and effective response.

Communication and Engagement: AI can be used to develop targeted communication strategies to inform the public and promote preventative measures

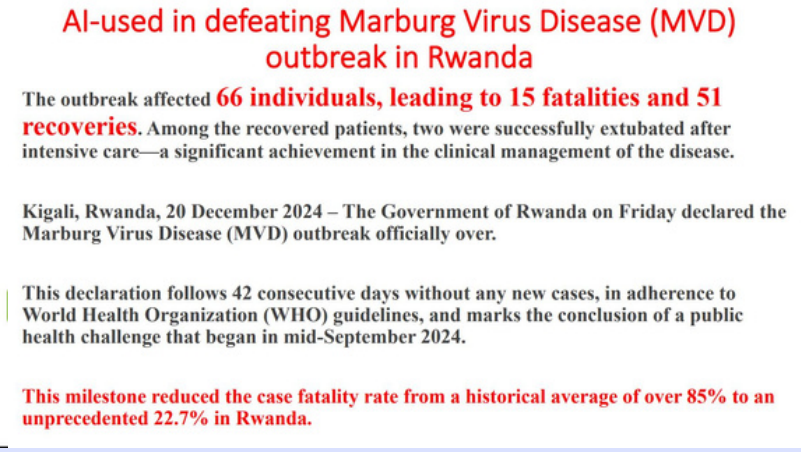
AI-powered Outbreak Response:

Rapid Detection and Confirmation: AI can analyze large datasets of patient information to quickly identify and confirm outbreaks, enabling swift intervention.

Tracking and Containment: AI can track the spread of outbreaks, identify high-risk individuals, and help implement containment strategies.

Resource Allocation: AI can help optimize the allocation of resources during an outbreak, such as medical supplies, testing facilities, and vaccination programs.

Predictive Analytics: AI can be used to predict the potential course of an outbreak, allowing for more effective planning and resource allocation



AI-used in defeating Marburg Virus Disease (MVD) outbreak in Rwanda

The outbreak affected **66 individuals, leading to 15 fatalities and 51 recoveries.** Among the recovered patients, two were successfully extubated after intensive care—a significant achievement in the clinical management of the disease.

Kigali, Rwanda, 20 December 2024 – The Government of Rwanda on Friday declared the Marburg Virus Disease (MVD) outbreak officially over.

This declaration follows 42 consecutive days without any new cases, in adherence to World Health Organization (WHO) guidelines, and marks the conclusion of a public health challenge that began in mid-September 2024.

This milestone reduced the case fatality rate from a historical average of over 85% to an unprecedented 22.7% in Rwanda.

Question and Answer (Q&A) Session

The Q&A session featured meaningful interactions between attendees and speakers.

Key themes included:

- **Community Data Integration:** Carl asked Audrey Odogu about challenges in integrating community-driven data into AI models. Odogu highlighted manual data collection and evolving Nigerian policy guidelines as barriers, emphasizing patience and community trust-building.
- **BEACON vs. ProMED:** Axby asked Dr. Bhadelia, "How is BEACON different from ProMED?" Dr. Bhadelia explained BEACON's open-source LLM and contextualized reporting, distinguishing it from ProMED. Prof. Tambo reinforced the need for stakeholder engagement in contextual systems.
- **AI in Healthcare Economy:** Zoya asked all speakers, "How do you see the role of AI in the healthcare economy in the future? Is it useful or is it taking human beings' place, causing economic problems for health caregivers?" Dr. Bielick emphasized AI's supportive role, noting liability concerns prevent job replacement. Prof. Tambo and Odogu framed AI as a tool to enhance efficiency and accessibility, particularly in the Global South, urging focus on responsible use.
- **Advocacy for AI:** Prof. Tambo urged stakeholders to promote AI's benefits in policy reform and decision-making for global health security.

Plan for continued engagement

This event reflects the Infectious Disease Alliance's dedication to promoting equitable health solutions. IDA is committed to fostering ongoing collaboration and action beyond the event, ensuring sustained momentum in the fight against infectious diseases. The following steps outline our plan for continued engagement:

1. **Follow-Up Communication:** Share a post-event package with participants, including the report, recording, and the Call to Action.
2. **Stakeholder Network Development:** Create a platform for participants to connect, share insights, and collaborate.
3. **Periodic Webinars and Workshops:** Host follow-up events to revisit key topics, share updates, and facilitate ongoing dialogue.
4. **Policy Advocacy Campaigns:** Utilize event outcomes to engage policymakers in adopting AI and Big Data-driven strategies.
5. **Annual Convening:** Organize an annual event to evaluate progress, share innovations, and reinforce commitments to advancing digital health solutions.

By maintaining active communication, fostering collaboration, and holding ourselves accountable to measurable goals, IDA aims to drive sustained impact and empower stakeholders to take meaningful action against infectious diseases using AI and big data globally.

Click here to watch the recording of the webinar

Call to action
Turning Innovation into Impact

Dear Global Health Leaders, Policymakers, Technologists, and Advocates,

We stand at a **transformative moment** in the fight against infectious diseases. The rapid **evolution of artificial intelligence (AI) and Big Data** offers unprecedented opportunities to **revolutionize outbreak detection, response, and preparedness**. However, challenges such as **data integration, privacy concerns, and technological disparities** threaten to limit their potential. The Infectious Disease Alliance (IDA) calls for urgent, coordinated action to harness these technologies and build resilient global health systems.

The Challenge Before Us

Infectious disease outbreaks continue to threaten global health security, **with delays in detection and response** exacerbating their impact. Despite advancements in AI and Big Data, **critical barriers** remain:

- **Data Fragmentation and Integration**: Siloed health data systems **hinder real-time analysis and coordinated outbreak response.**
- **Privacy and Ethical Concerns:** The use of AI in public health raises questions about **data security** and ethical deployment.
- **Technological Disparities**: **Low- and middle-income countries** often lack the infrastructure to leverage data-driven solutions effectively.
- **Insufficient Collaboration**: Limited partnerships between health professionals, data scientists, and policymakers **slow the adoption** of innovative tools.

Without **immediate and coordinated action**, we risk **missing the opportunity to transform outbreak control** and protect communities worldwide from emerging health threats.

Why This Matters for Global Health Security

AI and Big Data are **not just tools**—they are **essential for building a proactive, resilient response** to infectious diseases. When effectively deployed, they can:

✓ **Enable real-time outbreak detection** through **predictive modeling and early warning systems**.
✓ **Optimize resource allocation and decision-making** during health crises.
✓ **Enhance cross-sectoral collaboration** to address the complexities of One Health challenges.
✓ **Strengthen health equity** by improving access to data-driven solutions in underserved regions.

The IDA webinar brought together global experts to share insights, showcase successful applications, and chart the path forward for technology-driven epidemic control.

IDA's Call to Action: Turning Innovation into Impact

We urge **governments, technologists, public health stakeholders, and civil society** to take bold, coordinated steps:

Governments & Policymakers:
📌 Establish **clear regulatory frameworks** for **ethical AI use and data privacy** in public health.
📌 Invest in **interoperable health data systems** to enable **real-time outbreak monitoring**.
📌 Prioritize **funding for AI and Big Data research** to enhance pandemic preparedness.

Multilateral Organizations & Funders:

📌 Scale investments in **digital health infrastructure**, particularly in **low- and middle-income countries**.
📌 Foster **public-private partnerships** to co-develop scalable, equitable data-driven solutions.
📌 Support capacity-building programs to **train health professionals** in AI and data analytics.

Technology & Data Science Experts:

📌 Design **open-source AI tools** for outbreak prediction and response, accessible to all regions.
📌 **Address biases in algorithms** to ensure **equitable and inclusive** health solutions.
📌 **Enhance data interoperability** to facilitate **global collaboration and information sharing**.

Public Health & Healthcare Professionals:

📌 Integrate **AI-driven tools into routine outbreak surveillance and response strategies**.
📌 Advocate for **policies that prioritize data-driven decision-making** in health crises.
📌 Promote **digital literacy** to empower communities to engage with technology-based solutions.

Civil Society & Community Leaders:

📌**Champion the One Health approach**, ensuring **data systems account for human, animal, and environmental health**.
📌 Demand **accountability from policymakers** to ensure **equitable access** to AI and Big Data tools.
📌 Support **initiatives** that **raise awareness** about the role of technology in outbreak control.
Time is Running Out. Act Now!

The window to strengthen global health security through AI and Big Data **is narrowing**. Every delay in adopting these technologies **risks lives and undermines our ability to respond** to future pandemics. The Data-driven Decision Making in Outbreak Control webinar is an opportunity to join **a global movement to transform outbreak response** and build a healthier, more resilient world.

💡 **Join the Movement:**

✅ **Sign the Call to Action**—advocate for **stronger policies and investments in AI and Big Data.**

✅ **Support R&D Investment**—push for **sustained funding** in data-driven health solutions.

📢 **Change starts with action. Register now and help shape the future of outbreak control!**

Together, we can harness AI and Big Data to build a healthier, more resilient world.

Click here to sign the call to action

IDA thanks speakers, participants, and partners for their valuable insights. Together, we can advance global health by leveraging AI and equitable data strategies to combat outbreaks effectively.

IDA
Infectious Disease Alliance
www.id-alliance.org
info@id-alliance.org