



IANPHI Asia and Africa Networks – Webinar on “Artificial Intelligence and Public Health”

November 18, 2024 – 2pm -3.40pm CET

Summary

Dr. Muhannad Aloraini, Chair of the IANPHI Asia Network and Director of the Saudi Public Health Academy, introduced the webinar. He also moderated the webinar.

The first speaker of the webinar was **Mr. Abel W. Walekhwa**, Director of IDEMU Mathematical Modeling Unit in Uganda. He presented his work on “The application of AI in Mathematical modeling for public health interventions”.

Mr. Walekhwa introduced mathematical modeling as a tool for studying complex systems and predicting population dynamics, emphasizing its role in guiding public health interventions like vaccination, isolation, and health education. He highlighted the long history of using mathematical models in public health, with examples like the HIV epidemic, the Ebola outbreak, and the COVID-19 pandemic.

The core of his talk focused on how artificial intelligence contributes to mathematical modeling. AI tools, such as machine learning and deep learning, can help generate mathematical concepts, interpret model outputs, and speed up problem-solving. He strongly recommended embracing AI in mathematical modeling for public health, citing his own research on AI's potential in low- and middle-income countries. He discussed a project he led on advancing AI for public health modeling in these regions, noting that despite AI tools being used in Asia and Africa, many of the studies were authored by researchers from high-income countries, revealing a capacity gap in the Global South.

Mr. Walekhwa is involved in a study called "Data Science Without Borders," focused on building AI capacity in health data management in Cameroon, Senegal, and Ethiopia. Through training sessions in Kenya, the project aims to improve AI use in public health interventions.

He concluded by stressing the need for AI policies, better data-sharing frameworks, and further investment in building AI capacity in Africa and Asia. He highlighted the importance of creating AI tools tailored to local contexts, supported by government funding, as seen in Uganda's Makara AI Lab, which focuses on public health issues like cervical cancer.

The second speaker was **Prof. Zhihang Peng**, Deputy Director of the Information Center at China CDC. He presented his work on “Application of AI in Infectious Disease Surveillance and Early Warning in China”.

Prof. Peng articulated his presentation following this outline:

1. **Research Background**

China's infectious disease surveillance system monitors various types of diseases, such as notifiable infectious diseases, health emergencies, and specific diseases. However, the system faces several challenges, including limited data from clinical cases, a lack of information sharing across sectors, and weaknesses in real-time surveillance and early warning.

2. **Adoption of AI**

To address these shortcomings, China has incorporated AI into the surveillance and early warning system. AI enables the analysis of large datasets from public health, clinical systems, and population data, aiding in risk assessment, disease identification, and early warning.

3. **AI in Surveillance**

AI is applied in various areas like hazard identification, risk assessment, early warning, and tracking disease prevalence. Machine learning models are used to identify risk factors, predict epidemics, and estimate key indicators like the reproduction number (RT), which helps to predict disease outbreaks.

4. **Advantages of AI**

AI brings significant advantages, including powerful generalization ability, increased efficiency in identifying disease risks, and improved surveillance through cross-sector and regional data sharing. AI also enhances learning capacity, reduces testing times, and allows for better early warning and epidemic prevention.

5. **Future Outlook**

Moving forward, AI will be essential for integrating big data, enhancing model generalization, and developing intelligent disease surveillance and early warning systems. The future research will focus on combining AI with other surveillance technologies to address public health and biosecurity challenges effectively.

To conclude, Prof. Peng explained that AI plays a crucial role in improving China's infectious disease surveillance and early warning systems, offering advanced capabilities for disease prediction and outbreak management.

The third (and last) speaker was **Dr. Homoud Algarni**, senior Global Health expert currently serving as the Director of the Global Health Department at the Saudi Public Health Authority. He presented on “AI and Global Health Inequality”.

He discussed how Artificial Intelligence (AI) can address global health inequality, with a focus on its potential benefits in bridging gaps in healthcare access and quality. The presentation covers several key topics:

1. Global Health Inequality

Health inequality refers to disparities in healthcare access and quality between different regions and populations. Many low-income countries and marginalized communities face higher mortality rates due to inadequate healthcare access. These inequalities are evident in aspects such as life expectancy, disease prevalence, and health outcomes, particularly in maternal and child mortality rates in developing countries.

2. Role of AI in Addressing Health Inequality

- **AI Capabilities:** AI can analyze vast amounts of data, identify patterns, and make predictions, improving healthcare outcomes. AI enables early disease detection, vaccine development, and remote care, which helps underserved populations access healthcare more efficiently.
- **Disease Prevention:** AI can analyze medical images to detect diseases like cancer and heart disease early, allowing for timely intervention. It also aids in vaccine development by predicting the effectiveness of vaccine candidates.
- **Telemedicine and Remote Care:** AI facilitates remote consultations, diagnosis, and treatment, improving access to healthcare in rural and underserved areas. It also supports mobile health solutions, offering healthcare information, preventive care reminders, and disease management through apps.
- **Cost Reduction:** AI can predict maintenance needs for medical equipment, reduce healthcare costs, and accelerate drug discovery, making medications more accessible to underserved populations.

3. Challenges and Limitations of AI

- **Technical Limitations:** AI's reliability depends on the data it is trained on, and insufficient or biased data can lead to inaccurate predictions. AI algorithms also require significant resources, which may not be available in all healthcare settings.
- **Ethical Concerns:** AI lacks human empathy and personalized care, potentially impacting patient satisfaction. Ensuring fairness, transparency, and addressing biases is crucial to avoid exacerbating healthcare disparities.
- **Infrastructure and Policy Challenges:** Effective AI implementation requires advanced infrastructure, connectivity, and trained personnel, which may be lacking in some regions. Strong policy and regulatory frameworks are necessary to address privacy, data protection, and ethical concerns.

4. Future of AI in Health Inequality:

- **Advancements in AI:** As AI technology improves, it will enhance disease detection, personalized treatment, and patient outcomes. Integrating AI with emerging technologies like wearable devices will enable real-time health monitoring, facilitating early intervention.
- **Policy and Regulatory Support:** Collaboration between governments, healthcare organizations, and tech companies is vital to share resources, promote innovation,

and ensure equitable distribution of AI healthcare solutions. Establishing ethical guidelines and standards is essential for responsible AI use in healthcare.

To conclude, Dr. Algarni explained that AI has the potential to reduce global health inequality by improving disease prevention, healthcare access, and cost efficiency. Continued advancements in AI, supported by appropriate policies, can transform the healthcare landscape and improve health outcomes for all.

He asked the audience to share AI-based solutions in their country and the results and challenges faced in implementing these solutions.

The presentations were followed by a dynamic Q&A session with the audience.