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FORSCHUNG + ENTWICKLUNG

Smart AI accelerates Drug
Development, hence, extends
Time Span for Return on
Investment within Patent Term

DIGITAL HEALTH

Digitale Gesundheitsanwendungen (DiGA)
langsam auf dem Vormarsch

INTERNATIONAL SCOPE

Digital Health Africa 2024:
The Future of Healthcare
Delivery on the Continent



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Digital health technologies have the potential to transform the African health sector

Digital Health Africa 2024: The Future of Healthcare Delivery on the Continent

The Digital Health Africa (DHA) 2024 conference brought together healthcare professionals, policymakers, researchers, and industry leaders, to discuss the current landscape and future potential of digital health, telemedicine, and artificial intelligence (AI) in Africa. The conference provided an overview of the digital health ecosystem in Africa, highlighting opportunities and challenges in leveraging these technologies to improve healthcare access, quality, and outcomes across the continent. The hybrid event attracted 175 participants, with 60 attending in person at the Biomedical Research Institute (BMRI) at Stellenbosch University Faculty of Medicine and Health Sciences in Cape Town, South Africa and the remainder joining virtually on 23 and 24 February 2024.

| Rohan Benecke, Bernd Rosenkranz, Goonaseelan (Colin) Pillai

Introduction

The Digital Health Africa 2024 conference was a convening to report on, and foster collaboration across diverse disciplines using health technologies in Africa. Participants discussed the potential impact of digital health, telemedicine, artificial intelligence (AI), and machine learning on the African health sector, and sought to identify opportunities and challenges in leveraging these technologies to improve the quality of health-

care services and patient outcomes across the continent.

Digital health technologies have the potential to transform healthcare delivery in Africa, where many countries face challenges such as limited access to healthcare services, inadequate infrastructure, and a shortage of healthcare professionals [1][2][3][4][5]. The current state of digital health in Africa varies across countries, with some nations making significant strides in adopting digital solutions while others lag behind.

For example, South Africa, Kenya, and Rwanda have implemented national digital health strategies and have seen growth in the use of telemedicine, mobile health applications, and electronic health records. South Africa's National Digital Health Strategy (2019–2024) aims to strengthen digital health governance and develop robust systems to enhance healthcare delivery [6]. Similarly, Kenya and Rwanda are leveraging digital technologies to improve healthcare access and quality, with notable advancements in teleconsultations, remote monitoring, and electronic health records [7][8]. However, many African countries still struggle with basic infrastructure requirements, such as reliable electricity and internet connectivity, which hinder the widespread adoption of digital health technologies. This digital divide is a significant barrier to the effective implementation of these technologies [9].

Despite these challenges, the potential impact of technological advancements on healthcare delivery in Africa is immense [10]:

- Telemedicine can bridge the gap in access to healthcare services, particularly in rural and re-



Digital Health Africa 2024

When and Where • 23 and 24 February in online and life presence at the Biomedical Research Institute of Stellenbosch University, Tygerberg, Cape Town, South Africa.

Organising Bodies • Stellenbosch University, Pharmacometrics Africa, Fundisa African Academy of Medicines Development

Chairs • Bernd Rosenkranz (Fundisa African Academy of Medicines Development), Kanshu Rajaratnam (School for Data Sciences and Computational Thinking, Stellenbosch University), Colin Pillai (Pharmacometrics Africa)

Organising Committee • Chair: Rohan Benecke (Division of Clinical Pharmacology, Stellenbosch University), Tirhani Maluleke (Post-doctoral Research Fellow, Fundisa African Academy of Medicines Development), Gabe McClelland (Pharmacometrics Africa), Karin Steinecke (Charité Universitätsmedizin Berlin), Catriona Waitt (University of Liverpool/Infectious Diseases Institute Makerere University), Sunday Oladayo Oladejo (School for Data Science and Computational Thinking, Stellenbosch University).

mote areas, by enabling remote consultations and diagnosis.

- Researchers using AI and machine learning can support decision-making processes for healthcare professionals, improve the accuracy of diagnoses, and optimise resource allocation [11].
- Electronic health records can facilitate the efficient management of patient data and enhance continuity of care, while facilitating a real world evidence research agenda.
- Mobile health applications can empower patients to take a more active role in managing their own health and promote health education and awareness [7][8].

Conference format

The Digital Health Africa 2024 conference provided a platform for exploring digital health in Africa, offering insights and recommendations for policymakers, healthcare leaders, and innovators. By fostering collaboration, innovation, and inclusion, the African digital health community can work towards building a more equitable, sustainable, and patient-centred healthcare system.

The conference took place on 23 and 24 February, at the Biomedical Research Institute (BMRI) at Stellenbosch University Faculty of

Medicine and Health Sciences in Cape Town, South Africa. The hybrid event attracted 175 participants, with 60 attending in person and the remainder joining virtually.

On each day, keynote talks focused on the latest advancements in digital health, telemedicine, AI, and machine learning, and their potential applications in the African context. Invited speakers then explored themes such as the ethical and regulatory considerations surrounding digital health, the role of public-private partnerships in driving innovation, and the importance of user-centred design in developing digital health solutions. The plenary sessions provided an opportunity for delegates to discuss key takeaways from the sessions with speakers and each other, and to identify areas for collaboration.

Keynote speakers, invited talks, and panel discussions at DHA 2024 covered a wide range of topics, emphasising the transformative potential of digital technologies in reshaping healthcare delivery and improving patient outcomes. Discussions included ethical and regulatory considerations, challenges in implementing telemedicine, and the role of public-private partnerships in driving innovation. Key themes that emerged included the need for increased collaboration and knowledge sharing among stakeholders, the importance of addressing ethical and data management concerns,

and the potential for digital technologies to improve healthcare access and quality.

Day one focused on the current state of digital health in Africa, regulatory perspectives and trends shaping the industry. Speakers discussed government policies promoting digital health solutions, standardisation, and interoperability for seamless technology integration. Over the two days, presentations showcased private and public sector efforts in AI and machine learning, highlighting case studies on disease diagnosis, treatment outcomes, and patient care, stressing the importance of ethical considerations like data privacy and security. The final sessions emphasised patient outcomes, the ultimate goal of digital health technologies. Discussions highlighted patient-centred approaches prioritising accessibility, affordability, and quality of care, and the potential for telemedicine and mobile health applications to empower patients in managing their health.

Participants recognised the need for inclusion and bridging knowledge silos. The success of digital health in Africa relies on engaging diverse stakeholders to ensure culturally relevant solutions that address the unique needs of the African context. The conference underscored the importance of interdisciplinary dialogue and collaboration to tackle challenges such as infrastructure limitations and workforce shortages.



Stellenbosch University's new Biomedical Research Institute (BMRI)—venue of the Digital Health Africa 2024 conference—is the most advanced research facility of its kind on the African continent. © BMRI

For detailed summaries, videos, and additional resources from the DHA 2024 conference, please visit www.digitalhealthafrica.org (last visit: 5 August 2024).

Selected conference highlights

The presentations at the DHA 2024 conference highlighted the potential of various digital technologies, such as genomic surveillance, AI, and quantum computing, to transform healthcare delivery and improve patient outcomes on the continent.

The Speakers • There was a diverse array of speakers, including some from Germany, each brought their own expertise to the event. The speakers demonstrated a wide range of knowledge. You can exchange ideas with them to benefit from their insights and experience. The list of speakers is available at <https://digitalhealthafrica.org/speakers/> (last visit: 5 August 2024).

Applying and developing big data analysis for genomics in the 21st century • In the opening keynote, Tulio de Oliveira, a renowned bioinformatician, shared experiences in using genomic surveillance

and data analysis to inform public health responses to the COVID-19 pandemic. He emphasised the importance of combining various types of digital data and utilising advanced data analysis methods and high-performance computing to effectively respond to public health emergencies.

Making equity and social solidarity a reality in healthcare • Nicholas Crisp, from the South African Department of Health, discussed the role of digital solutions in achieving universal health coverage and implementing National Health Insurance (NHI) in South Africa. He stressed the importance of digital platforms at every point in the healthcare system and the need for interoperability and standardisation of digital systems.

Bridging quantum frontiers: from biological phenomena to drug discovery innovation • Francesco Petruccione presented a lively and thought-provoking talk on the potential applications of quantum technologies in medicine and drug discovery. He explained how quantum computing could lead to exponential speedups in solving complex computational problems in drug discovery and presented the increasing accessibility through

cloud services and user-friendly software.

Navigating the digital landscape in medtech • Olivia Koburongo showcased their work on developing an AI solution that analyses medical images to diagnose pneumonia. She shared her start-up company's vision for building an AI-powered platform capable of performing tasks across various medical specialties.

Other prominent talks • Other notable speakers covered the status of digital technologies to increase efficiency of clinical research (Adriaan Kruger), national clinical laboratory services (Koleka Mlisana) and medicines regulation in Africa (Christelna Reynecke). The potential of a tele-ICU (Intensive Care Unit) initiative to address the shortage of critical care clinicians in Africa (Fathima Paruk) also showcased the opportunities of collaborations with their global north partners (Karin Steinke). The presentations on cutting-edge research applications included Innocent Asimwe and Samer Mouksassi who presented accessible digital technologies to improve dosing requirements for patients.

Links to all the talks, summaries and discussions are accessi-

ble via the conference webpage <https://digitalhealthafrica.org/programme/> (last visit: August 5, 2024).

Major themes and insights

Ethical and regulatory considerations • The hybrid conference technology allowed several themes to emerge from the panel discussions with the speakers and the in-person and virtual audience. One of the key discussions focused on the ethical and regulatory considerations surrounding digital health technologies. The discussions emphasised the need for robust data governance frameworks, patient privacy protection, and clear guidelines for the responsible development and deployment of AI-powered solutions in healthcare.

Resource-limited settings • Another panel explored the challenges and opportunities in implementing telemedicine solutions in resource-limited settings. Participants shared their experiences in leveraging telemedicine to improve access to healthcare services in rural and remote areas, highlighting the importance of user-centred design, community engagement, and capacity building for healthcare professionals.

Public-private Partnerships • The role of public-private partnerships in driving digital health innovation was also a topic of discussion. Collaboration between governments, academia, industry, and civil society organisations could create an enabling environment for digital health startups and scale-up of successful initiatives.

Digital health solutions need to be inclusive, equitable, responsive • A recurring theme across the panel discussions was the importance of ensuring that digital health solutions are inclusive, equitable, and responsive to the unique needs and contexts of African communities. Panelists stressed the need for involving end-users, such as patients and healthcare providers, in the design and implementation of digital health interventions

to ensure their relevance and acceptability.

Improve access to healthcare services, particularly in remote and underserved areas • Digital platforms are being leveraged to improve access to healthcare services, particularly in remote and underserved areas. Telemedicine solutions enable patients to consult with healthcare providers remotely, reducing the need for travel and increasing the efficiency of healthcare delivery. Electronic health records and data-sharing platforms are facilitating the exchange of patient information across different healthcare settings, promoting continuity of care and enabling data-driven decision-making.

Challenges and opportunities

While digital health solutions offer immense potential to improve healthcare outcomes in Africa, the conference also highlighted the significant challenges in implementing these technologies. One of the primary obstacles is the lack of adequate infrastructure, including reliable electricity, internet connectivity, and digital literacy among healthcare workers and patients. Speakers emphasised the need for investments in infrastructure development and capacity building to create an enabling environment for digital health adoption.

Another challenge is the complex regulatory landscape surrounding digital health technologies. The conference discussions underscored the importance of establishing clear legal and ethical frameworks to govern the use of digital health solutions, ensure patient privacy and data security, and promote trust in these technologies. Panelists also highlighted the need for collaboration between policymakers, industry stakeholders, and healthcare professionals to develop and harmonise regulations across African countries.

Education and training were identified as critical components in overcoming the challenges of digi-

tal health implementation. Speakers stressed the importance of integrating digital health into medical education curricula and providing ongoing training opportunities for healthcare workers to develop the necessary skills and competencies. Engaging patients and communities in digital health literacy programmes was also seen as crucial to promote the uptake and effective use of digital health solutions.

The challenges associated with access to large, diverse, and high-quality datasets for training machine learning and AI algorithms to mitigate the potential for bias and discrimination in AI-powered decision-making. Speakers emphasised the need for responsible AI development and deployment, with a focus on ethics, fairness, and accountability.

Despite these challenges, the conference participants expressed optimism about the vast opportunities that digital health presents for Africa. By leveraging the continent's rapidly growing mobile phone penetration and young, tech-savvy population, there is immense potential to leapfrog traditional healthcare delivery models and develop innovative, context-specific digital health solutions.

Future directions

The conference participants highlighted the need for continued investment in research and innovation to develop and validate digital health solutions that are contextually relevant, scalable, and sustainable. They emphasised the need for research and studies to assess the feasibility and impact of these technologies in African healthcare settings.

One of the key future directions discussed was the integration of digital health solutions into national health systems and policies. Speakers emphasised the importance of aligning digital health initiatives with broader health system strengthening efforts and ensuring their compatibility with ex-

isting healthcare infrastructure and workflows.

Another emerging trend was the increasing focus on patient-centred design and user experience in digital health solutions. Participants stressed the need to involve end-users, including patients, healthcare providers, and community members, in the development and evaluation of digital health tools to ensure their acceptability, usability, and effectiveness.

The conference also highlighted the potential of emerging technologies, such as blockchain for secure health data management, 5G networks for enhanced telemedicine capabilities, and the Internet of Things (IoT) for remote patient monitoring and connected care.

Finally, the conference underscored the importance of fostering collaborations and partnerships among diverse stakeholders, including researchers, policymakers, industry players, and civil society organisations, to drive the digital health agenda forward in Africa.

Recommendations and action points

For healthcare practitioners

The DHA 2024 conference provided valuable insights and recommendations for healthcare professionals looking to integrate digital health strategies into their practices. One key recommendation was for practitioners to actively seek out training and education opportunities to develop their digital health competencies. This includes learning about the latest digital health tools and platforms, understanding how to integrate them into clinical workflows, and acquiring skills in data analysis and interpretation. Healthcare professionals should also engage in ongoing professional development to stay up to date with the rapidly evolving digital health landscape.

Another important action point for practitioners is to foster a culture of innovation that encourages adoption to evaluate digital health

solutions, sharing best practices and lessons learned, and actively providing feedback to improve digital health interventions. Practitioners should also seek opportunities to collaborate with other healthcare professionals, technology experts, and patients to co-design and implement digital health strategies that meet the specific needs of their communities.

For policymakers

The conference highlighted the crucial role of policymakers in creating an enabling environment for digital health initiatives to thrive in Africa. One key recommendation was to develop and implement clear national digital health strategies and policies that align with broader health system goals and priorities. These strategies should provide a roadmap for the adoption and scaling of digital health solutions, while also addressing critical issues such as data governance, privacy and security, and interoperability standards.

Policymakers were also urged to invest in digital health infrastructure, including expanding access to reliable internet connectivity, promoting the use of electronic health records, and establishing secure data-sharing platforms. These investments are crucial to creating the necessary foundation for digital health solutions to be effectively deployed, evaluated and scaled across the continent.

Another important action point for policymakers is to foster collaborations and partnerships that bring together government agencies, healthcare providers, technology companies, academia, and civil society organisations to jointly develop and implement digital health initiatives. Engagement with regional and international bodies could guide alignment and harmonisation of digital health policies and standards for Africa.

For researchers

The conference identified several gaps in current research and proposed areas for further investigation to advance the digital health agenda in Africa. Speakers emphasised the

need for more context-specific research that considers the unique challenges and opportunities of implementing digital health solutions in resource-limited settings.

One key recommendation for researchers is to conduct more implementation science research to understand the factors that influence the adoption, scalability, and sustainability of digital health interventions in African healthcare systems. This includes examining the technical, organisational, and human factors that enable or hinder the successful implementation of digital health solutions and developing evidence-based strategies to address these challenges.

Another important research gap identified was the need for more rigorous evaluation studies to assess the impact of digital health interventions on patient outcomes, health system performance, and cost-effectiveness. Researchers were encouraged to design studies that employ robust methodologies, such as randomised controlled trials and pragmatic trials, to generate high-quality evidence on the effectiveness of digital health solutions in real-world settings.

The conference also highlighted the importance of conducting user-centred research to ensure that digital health solutions are designed and developed with the needs and preferences of end-users in mind. This involves engaging patients, healthcare providers, and community members throughout the research process, from needs assessment and co-design to usability testing and evaluation.

Finally, researchers were urged to explore emerging research areas, such as the ethical implications of AI in healthcare, the potential of big data analytics for public health surveillance, and the use of mobile health technologies for chronic disease management. The healthcare research community in Africa can contribute to the generation of evidence-based knowledge and innovations to improve healthcare outcomes and advance health equity across the continent.

Conclusion

The potential of digital health advances to serve the needs of Africa presents an unparalleled opportunity to elevate the state of healthcare across the continent. The Digital Health Africa 2024 conference served as a crucial meeting point for a diverse array of organisations and individuals dedicated to advancing digital health on the continent.

Continued engagement, innovation, and collaboration among stakeholders will be essential in overcoming existing barriers and translating the conference's insights into significant healthcare improvements across Africa. |

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AUTHORS



Dr Rohan Benecke is a multidisciplinary researcher working at the intersection of physiology, pharmacology, pharmacometrics, and data science. With a PhD

in Physiology and additional training in pharmacometrics, he applies a first-principles approach to problem-solving, primarily using the open-source statistics program “R” for data analysis and modeling. His work is driven by a passion for addressing diverse challenges with an open-minded, multidisciplinary perspective.

Contact:
rhn@sun.ac.za



Professor Dr Bernd Rosenkranz is a Clinical Pharmacologist with extensive experience in international clinical drug development and former head of

the Division of Clinical Pharmacology at Stellenbosch University. He actively promotes capacity strengthening in medicines development and regulation in Africa, as President of Fundisa African Academy of Medicines Development in Cape Town and Visiting Scientist at the Institute for Clinical Pharmacology and Toxicology, Charité Universitätsmedizin Berlin. He is Specialty Chief Editor of *Frontiers in Pharmacology – Drugs Outcomes Research and Policies*.

Contact:
rosenkranz@sun.ac.za



Professor Dr Goona-seelan (Colin) Pillai is a clinical pharmacologist working on strengthening scientific capabilities in low and middle-income countries. With extensive

experience in the pharmaceutical industry and academia, he specializes in applying mathematical models to drug development decision-making. He holds multiple Honorary Professorships and currently serves as a Senior Advisor on capacity development and training programmes for global health to the Bill and Melinda Gates Foundation.

Contact:
colin@cpplusassociates.org