issue 5 - volume 9
may 2026

genomics, epidemics
& microbes

the gem

African STARS Fellowship

Growing talent in science, innovation, and public health

Mapping a Moving Virus

Tracking West Nile virus with the help of a new R14 million grant

A Golden Honour for Science

Prof Tulio de Oliveira awarded the Order of Mapungubwe in Gold

summary

the gem: Centre for Epidemic Response and Innovation (CERI) & South African Centre for Epidemiology and Modelling Analysis (SACEMA), Stellenbosch University, and KwaZulu-Natal Research, Innovation and Sequencing Platform (KRISP), UKZN, Durban
director: Tulio de Oliveira **editors**: Tulio de Oliveira, Katrine Anker-Nilssen, Maambele Khosa, and Cheryl Baxter
art director: Victor Hugo Szortyka **graphic designers:** Tulio de Oliveira, Katrine Anker-Nilssen, and Maambele Khosa
printing: Aslam Arnolds **websites:** https://ceri.org.za/, https://www.sacema.org/, https://www.krisp.org.za/

“Together we are building African expertise, strengthening institutions, and creating opportunities for scientists to lead solutions to African and global challenges.”

editorial

This issue of **the gem** celebrates the people behind the science – the researchers, students, innovators, operational leaders, and partners helping shape the future of public health in Africa. One theme emerges repeatedly: the importance of investing in talent. From genomic surveillance and vaccine development to antimicrobial resistance, climate-sensitive diseases, and outbreak preparedness, progress depends not only on technology and infrastructure, but on the expertise behind them.

Nowhere is this more evident than in the journeys of our African STARS fellows. Coming from across the continent, these young scientists are building expertise in genomics, bioinformatics, biotechnology innovation, and public health while remaining deeply connected to the communities they hope to serve. Their stories remind us that scientific success is ultimately measured by the impact it has.

Capacity development is another thread running throughout this issue. From the VirCapSeq-VERT workshop hosted at CERI to the Virus Evolution and Molecular Epidemiology (VEME) workshop, as well as new research units and initiatives, these efforts are strengthening genomic surveillance, bioinformatics and outbreak response capacity across Africa. Increasingly, African researchers are not only contributing to global science, but leading it. Many of these efforts are grounded in One Health approaches that recognise the connections between human, animal, and environmental health.

We also celebrate significant milestones. Prof Tulio de Oliveira’s receipt of the Order of Mapungubwe in Gold recognises more than two decades of leadership in genomic surveillance and epidemic preparedness, and the impact of sustained investment in people, partnerships, and scientific infrastructure. At the same time, we acknowledge the many contributions that make research possible every day. Whether through operational excellence, mentorship, training, collaboration or scientific leadership, progress is always a collective effort.

As you read this issue, we hope you will see not only the breadth of work taking place across CERI, SACEMA, and our partner networks, but also the shared commitment that connects it all: building African expertise, strengthening institutions, and creating opportunities for scientists to lead solutions to African and global challenges.

text: **Katrine Anker-Nilssen**
photo: **CERI Media, Leo Burnett**

A Golden Honour For Science

Prof Tulio de Oliveira has been awarded the Order of Mapungubwe in Gold for his leadership in genomic surveillance, public health innovation, and building Africa's capacity to detect and respond to infectious disease threats.

text: **CERI Media** photos: **Supplied**

Prof Tulio de Oliveira, Director of the Centre for Epidemic Response and Innovation (CERI) at Stellenbosch University and founder and director of the KwaZulu-Natal Research Innovation and Sequencing Platform (KRISP) at the University of KwaZulu-Natal, has been awarded the Order of Mapungubwe in Gold by President Cyril Ramaphosa, in recognition of more than two decades of work building South Africa's capacity to detect, track, and respond to infectious disease threats.

The Order of Mapungubwe is South Africa's highest civilian honour, awarded to citizens who have achieved excellence and exceptional accomplishment to the benefit of South Africa and beyond. Awarded across four categories, it is an honour that has been conferred upon Nelson Mandela, among others, placing it among the most distinguished in the country's history. Prof de Oliveira was recognised for his contribution to genomic surveillance and public health, including leadership in the identification and rapid characterisation of the Omicron variant of SARS-CoV-2 during the COVID-19 pandemic. As highlighted by the president in the award; the early detection of variants allows countries to prepare and save lives.

Under Prof de Oliveira's leadership, teams across CERI and KRISP have helped strengthen genomic surveillance capacity across Africa, building systems capable of rapidly detecting and monitoring emerging pathogens in real time. The rapid identification and transparent reporting of Beta in 2020 and Omicron in late 2021 highlighted both the scientific expertise and collaborative infrastructure developed across African institutions and public health partnerships.

"I must stress that this was a team effort, and I would like to recognise some of the main contributors, including Dr Richard Lessells, Dr Jennifer Giandhari and Dr Sureshnee Pillay from KRISP at UKZN, and Prof Houryiiah Tegally, Dr Eduan Wilkinson, and Prof Cheryl Baxter from CERI at Stellenbosch University, who worked day and night throughout the pandemic to advance science that saves lives. I would also like to recognise the dozens of scientists and colleagues from the Network for Genomics Surveillance in South Africa (NGS-SA), a network fully funded by the Department of Science, Technology and Innovation (DSTI) and the South African Medical Research Council (SAMRC)," said Prof Tulio de Oliveira, director of CERI at Stellenbosch University and KRISP at University of KwaZulu-Natal.

Central to this work has been a long-term investment in building scientific capacity across Africa. Through CERI and KRISP, Prof de Oliveira and his teams have trained a new generation of African scientists in genomics, bioinformatics, and epidemic response, strengthening sequencing capacity across multiple countries on the continent. This infrastructure, built over more than two decades of work on viral outbreaks including HIV, Hepatitis B and C, Zika, Dengue, Chikungunya, and Yellow Fever, means that African institutions are not merely responding to health threats, but are increasingly positioned to lead the scientific response to them. It is this depth of investment in people, systems, and partnerships that underpins the kind of rapid, credible science that shaped the global COVID-19 response.

The Vice-Chancellor of Stellenbosch University, Prof Deresh Ramjugernath, noted the high calibre of expertise, innovation and societal impact reflected in Prof de Oliveira's work: "We warmly congratulate

Prof Tulio de Oliveira on this exceptional and richly deserved recognition. The awarding of the Order of Mapungubwe in Gold not only honours a remarkable scientific contribution to global public health, but also affirms the growing impact and leadership of African science on the world stage. As one of Africa's leading research-intensive universities, and through institutions such as CERI, Stellenbosch University continues to contribute meaningfully to global scientific discourse and solutions, while remaining firmly rooted in the developmental priorities of South Africa and the African continent. This recognition speaks to the world-class research, collaborative partnerships and thought leadership emerging from the African continent, and we are immensely proud of Prof de Oliveira and the teams whose work continue to strengthen global public health preparedness and response."

These sentiments were echoed by University of KwaZulu-Natal Vice-Chancellor and Principal, Prof Nana Poku, who said: "We warmly congratulate Prof de Oliveira on this richly deserved recognition. His contributions to bioinformatics, scientific innovation, and global health research give powerful expression to UKZN's vision of advancing scholarship that addresses real-world challenges and improves lives. We are proud to be associated with his work and remain committed to supporting the impactful research he continues to lead."

Prof de Oliveira's contributions have been recognised by scientific, public health, and governmental institutions worldwide. In 2021, he was named among Nature's ten scientists driving global scientific developments. The following year, he was recognised by the MIT Technology Review as one of ten pioneers of breakthrough technologies, and received the Gold Medal Award from the South African Medical Research Council, the German Africa Prize, and the Government of South Africa's Batho Pele Award for societal impact. He was also awarded the Order of Merit Medal by the President of Portugal, and later received the Discovery Health Lifetime Achievement Award.

Prof de Oliveira is listed among TIME100's most influential people of 2022 and TIME100 Health 2024, received the EDCTP Scientific Leadership Prize in 2025, and was elected Fellow of the Africa Leadership Initiative. The Order of Mapungubwe in Gold is the latest in a sustained record of recognition spanning science, public health leadership, and societal impact.

The surveillance and response work carried out through CERI and KRISP has been built on partnerships spanning African public health institutes, national ministries of health, and international bodies including Institut Pasteur Dakar and the Wellcome Sanger Institute, reflecting a model of science that is collaborative by design.

The recognition also reflects the growing global significance of African genomics research and innovation. Institutions such as Stellenbosch University, CERI, UKZN, and KRISP continue to contribute to scientific leadership, public health preparedness, and the development of genomics capacity across the continent.

For Stellenbosch University, Prof de Oliveira's appointment as Pro Vice-Chancellor for Industry, Business and Foundation Partnerships, alongside this national honour, reflects the university's "In and For Africa" commitment: research that is globally competitive, Africa-rooted, and built to deliver lasting societal impact.

Research is one of UKZN's five key strategic priorities, as outlined in the university's decadal Strategic Plan (2023-2032). The university is determined to enhance its position as a leading research-intensive institution dedicated to advancing knowledge and delivering practical solutions to the complex global challenges facing humanity, with an emphasis on local and international collaborations.

The scientific networks and surveillance systems developed through this work are already being applied to emerging threats beyond COVID-19. Through initiatives such as CLIMADE, researchers at CERI and partner institutions are investigating the intersection of climate change and infectious disease risk, building the evidence base needed to anticipate future epidemic threats. As genomic technologies continue to shape the future of medicine and public health, the collaborative infrastructure established across African institutions is expected to remain central to global preparedness and response efforts.

The Order of Mapungubwe stands as proof of what becomes possible when scientists are given the space, resources, and networks to lead. It affirms South Africa's role not at the periphery of global science, but as an active contributor shaping how the world detects, understands, and responds to emerging health threats. For Stellenbosch University, CERI, UKZN, and KRISP, the honour is both a moment of pride and a reminder of why this work matters.

"This was a true team effort. Scientists across CERI, KRISP, and the Network for Genomics Surveillance in South Africa worked day and night throughout the pandemic to advance science that saves lives."

– **Prof Tulio de Oliveira**

Engagement and Knowledge-Sharing

The Mastercard Foundation visits African STARS fellows at CERI.

photos: **CERI Media, Leo Burnett**

Representatives from the Mastercard Foundation communications team visited CERI and Stellenbosch University on 22 May to meet members of the African STARS Fellowship programme and learn more about their experiences, aspirations, and achievements.

The visit brought together Young Professional Programme (YPP) and MSc fellows for a day of engagement and knowledge-sharing. Using creative photo collages, fellows introduced themselves through stories of their upbringing, education, research interests, and career goals. These presentations provided valuable insight into the diverse backgrounds and ambitions of the young leaders supported through the programme.

Prof Cheryl Baxter, Head of Scientific Support at CERI, presented an overview of CERI and the African STARS Fellowship, highlighting its contribution to developing future African researchers, innovators, and public health leaders. Fellows also shared how the programme has shaped their academic and professional journeys, while engaging directly with members of the Mastercard Foundation team.

The programme included a tour of CERI's biotechnology facilities, led by Dr Ross Vermeulen, offering a glimpse into the advanced research infrastructure supporting scientific discovery and innovation in Africa. The day concluded with informal conversations and relationship-building among fellows, CERI staff, and Mastercard Foundation representatives during a wine and tea tasting at Stark-Condé Wines in the Jonkershoek Valley.

Tracking Epidemics Through Wastewater

New research highlights the potential of wastewater surveillance as a public health tool in low-resource settings.

SACEMA researcher Zinhle E. Mthombothi is among the authors of a new study exploring how wastewater surveillance can be used to track epidemic trends in low-resource settings. Using SARS-CoV-2 data from Gauteng Province, South Africa, the researchers demonstrate that wastewater monitoring can provide valuable population-level insights into disease transmission, even where clinical surveillance data are limited.

The study compared wastewater-based epidemiology with clinical testing data collected over a 21-month period. By analysing wastewater samples alongside reported COVID-19 cases, the researchers assessed whether changes in viral concentrations could provide an early indication of rising or declining infection levels within communities.

Their findings suggest that wastewater surveillance offers a cost-effective and inclusive approach to public health monitoring. Unlike clinical testing, which depends on individuals accessing healthcare services, wastewater surveillance captures information from entire communities, including asymptomatic and unreported infections. This makes it particularly valuable in settings where access to testing may be limited.

The researchers found that wastewater data generally reflected trends observed through clinical surveillance, identifying similar periods of increased transmission and decline. However, the timing and magnitude of these signals were not always perfectly aligned. While wastewater surveillance was effective at tracking overall patterns of infection, clinical testing retained advantages in precisely identifying peaks and changes in transmission dynamics.

The study highlights both the potential and the limitations of wastewater surveillance. Rather than replacing clinical testing, the authors argue that it can serve as a complementary public health tool, providing population-level insights that support disease monitoring and outbreak response. In resource-constrained settings, where large-scale clinical testing may not always be feasible, wastewater surveillance could play an important role in strengthening epidemic preparedness and response.

For access to the full publication, visit https://journals.plos.org/globalpublichealth/article?id=10.1371/journal.pgph.0006424

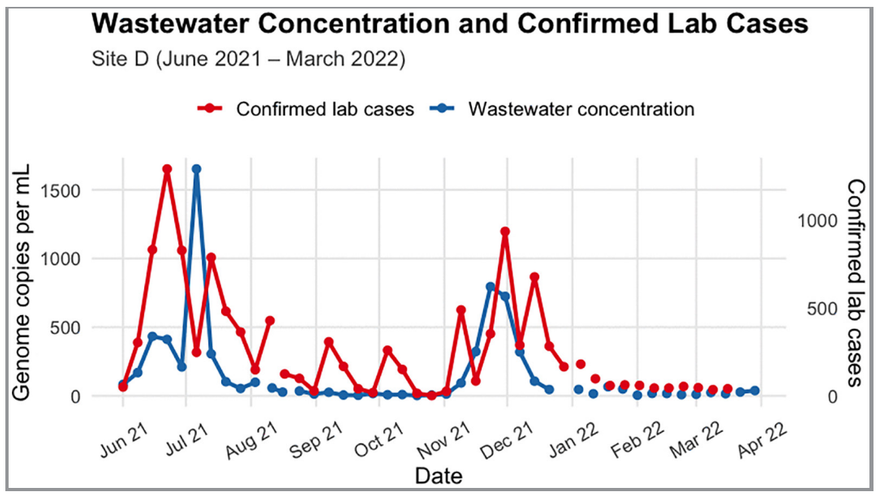


Figure 2 (left): *Catchment specific laboratory-confirmed weekly cases and SARS-CoV-2 concentrations in wastewater at Site D, June 2021 – March 2022. WW data were collected approximately weekly.*

Advancing Cancer Research

text: Paul Harris

In the fight against cancer, understanding the role of viruses is becoming increasingly important – particularly in regions like Africa, where virus-associated cancers remain a significant public health challenge. At a recent international symposium on Translational Virology of Oncogenic Viruses, researchers, clinicians, and scientists came together to bridge the gap between discovery and real-world application.

Held in KZN, the symposium focused on moving from epidemiology to intervention – ensuring that scientific insights translate into better diagnostics, treatment strategies, and patient outcomes. Across sessions, a common theme emerged: the need to connect cutting-edge research with the realities of healthcare systems on the ground, especially in high HIV-burden settings where virus-driven cancers are more prevalent.

On the final day of the meeting, Dr Jennifer Giandhari, Head of the KwaZulu-Natal Research Innovation and Sequencing Platform (KRISP), delivered a presentation on sequencing approaches and their clinical utility in cancer diagnosis and prognostication. Her talk highlighted how genomic technologies – once largely confined to research settings – are now playing an increasingly important role in clinical decision-making.

By analysing the genetic signatures of viruses and tumours, sequencing allows clinicians to better understand disease progression, predict outcomes, and tailor interventions. In practical terms, this means earlier detection, more precise treatment strategies, and ultimately improved patient care.

Dr Giandhari's contribution reflects her longstanding involvement with the International Centre for Genetic Engineering and Biotechnology (ICGEB), and her commitment to advancing genomics research that is both globally connected and locally relevant. Platforms such as this symposium play a critical role in bringing together expertise from across disciplines and geographies to address shared challenges.

The symposium also highlighted the value of collaboration within South Africa and the broader KZN region. "By fostering dialogue between researchers, clinicians, and public health practitioners, these engagements help ensure that innovation is not siloed, but instead translated into actionable solutions that benefit communities and drive collaboration," said Dr Giandhari.

Celebrating Zethu Luthuli

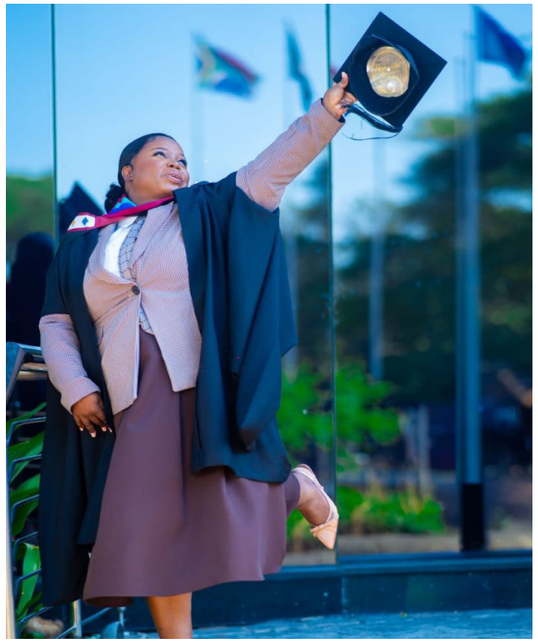
photo: Unique Gallery, Yanda Mjadu

Behind every high-functioning research institution is someone who ensures that everything runs smoothly behind the scenes. From procurement and compliance to grant administration, student support, and audit readiness, these essential functions keep research moving forward.

At CERI, that person is Zethu Luthuli. With more than 15 years of experience in research operations, Zethu plays a vital role in the day-to-day functioning of the Centre. Her expertise, dedication, and attention to detail help create the strong operational foundation that enables researchers and students to thrive.

Another significant milestone in her professional journey was graduating with an Advanced Diploma in Business Analysis from MANCOSA, while also completing her Postgraduate Diploma in Business Management. Her achievement reflects a continued commitment to growth, learning, and excellence – qualities that have long been evident in her work at CERI.

Congratulations, Zethu. We are proud of you and grateful for all that you do.



Why One Health Cannot Be Optional

As environmental change reshapes disease risk, One Health research is helping scientists understand and prevent outbreaks before they happen.

text: **Katrine Anker-Nilssen** photos: **AgroEcoHealth**

Emerging infectious diseases do not appear in isolation. They emerge through complex interactions between humans, animals, ecosystems, climate, and environmental change. For Prof Carla Mavian, Programme Director for One Health at the Centre for Epidemic Response and Innovation (CERI), those connections are central to preventing future outbreaks.

“I think one of the most important things to understand about One Health is that human health cannot really be separated from the health of animals and the environment,” says Prof Mavian. “Many emerging infectious diseases are not random events – they are often linked to how we change landscapes, interact with wildlife, manage agriculture, and respond to climate change.”

That perspective underpins AgroEcoHealth, an international research initiative exploring how agricultural and environmental change shape vector-borne disease risk. The project brings together expertise across genomics, ecology, epidemiology, entomology, and public health to study the links between farming systems, biodiversity, mosquitoes, wildlife, livestock, and human disease.

Prof Mavian joined the initiative while working at the University of Florida, drawn by the opportunity to explore how ecological disruption influences viral transmission and evolution. “I was particularly interested in understanding the ecology of viruses in these environments and how factors such as deforestation, human–animal interactions, and climate change can influence viral transmission and evolution,” she explains.

Her role within AgroEcoHealth focuses on linking pathogen genomics, phylogenetics, and phylodynamics with ecological and epidemiological data to track how arboviruses evolve across changing landscapes. “My expertise is particularly valuable in understanding how arboviruses evolve across changing environmental and agricultural landscapes, and how these evolutionary processes may increase the risk of spillover in humans and animals,” she explains.

The work builds on years of research at the intersection of genomics and public health. One of Prof Mavian’s previous studies identified rapid evolution and amplification of Everglades virus in the Florida Everglades, highlighting how ecological and climatic pressures can shape viral adaptation and transmission dynamics.

For her, AgroEcoHealth represents an important shift in infectious disease science – from reacting to outbreaks after they occur toward identifying risk earlier. “What excites me most about AgroEcoHealth is the opportunity to study arboviral emergence as part of a broader ecological system rather than only from a clinical or outbreak perspective,” she says. “By combining genomic surveillance with landscape and ecological data, we can start identifying the environmental conditions and transmission interfaces that may favor viral amplification, adaptation, or spillover into humans and animals.”

She adds that the long-term goal is to move toward prediction and preparedness. “In many ways, this project allows us to move from reactive genomics, understanding outbreaks after they occur, toward more predictive approaches aimed at identifying risk before widespread transmission occurs.”

At CERI, Prof Mavian’s work forms part of a broader One Health strategy combining genomics, epidemiology, ecology, and public health to strengthen surveillance and preparedness systems across Africa.

“This project aligns very closely with CERI’s broader mission of combining genomics, data science, and collaborative research to better understand and respond to emerging infectious diseases,” she says. “By combining field ecology, genomics, and public health perspectives across institutions and countries, it contributes to developing more coordinated surveillance systems that can detect and anticipate emerging disease threats.”

A defining feature of AgroEcoHealth is its strong emphasis on community engagement. Rather than treating communities simply as research sites, the project is designed around collaboration and participation.

Dr Amy Vittor, principal investigator within AgroEcoHealth, describes the research as a ‘feedback loop’. “We learn about the linkages between farming and health as we engage with farmers, who in turn help shape the relevant research questions,” she says. “Doing our best to understand the lived experience of the study participants is crucial if we hope to have a positive impact.”

Those conversations have already influenced the direction of the research. Farmers shared how short-term land leases driven by housing development pressures discourage long-term environmental investment, while local ecological knowledge introduced researchers to practices such as using guinea fowl for tick control and native beauty berry plants as mosquito repellents. “Our team learns so much from our study participants, and we incorporate this back into new research questions and recommendations,” says Dr Vittor.

For both researchers, this type of cross-sector work is becoming increasingly urgent as climate change, agricultural expansion, urbanisation, and ecological disruption continue reshaping ecosystems globally.

Prof Mavian notes that many regions, particularly across Africa, are simultaneously experiencing rapid environmental and climatic change while surveillance systems are still developing. “Integrating ecology, genomics, entomology, and public health allows us not only to detect pathogens, but also to understand the environmental and evolutionary processes that may drive spillover and amplification before large outbreaks occur,” she says.

Dr Vittor believes One Health research also needs to become more solution-driven and participatory. “There is a large need for research that is explicitly designed with solutions in mind,” she says. “That means building in participatory approaches that bring affected communities to the table, and committing to translating findings into practical guidance.”

For more information, visit www.agro-ecohealth.org

Mapping a Moving Virus

As climate change alters ecosystems and disease patterns worldwide, African researchers are taking a leading role in understanding one of the continent's most overlooked viral threats. A new R14 million international grant awarded to Dr Monika Moir at CERI will investigate how environmental change is influencing the spread of West Nile virus and help strengthen outbreak preparedness across Africa.

text: **Katrine Anker-Nilssen** photo: **CERI Media & MidJourney**

Climate and environmental change continue to reshape ecosystems across the world, and scientists are warning that mosquito-borne diseases may spread into new regions, become more frequent, and intensify in areas already under pressure.

A major new international research grant awarded to Dr Monika Moir at the Centre for Epidemic Response and Innovation (CERI) will place Africa at the centre of efforts to better understand one of these moving threats: West Nile virus. The three-year R14 million SAMRC–UKRI grant, funded through the U.K.'s International Science Partnerships Fund, focuses on the intersection of climate change, infectious diseases, and One Health research. The project combines genomics, ecological surveillance, and predictive modelling to better understand how outbreaks emerge – and how they might be anticipated earlier.

"This project is about understanding how climate change is reshaping the spread of West Nile virus in Africa," said Dr Moir. "Although the virus is endemic to Africa and can cause severe neurological disease in humans, it remains surprisingly understudied across much of the continent."

While West Nile virus is often associated with outbreaks in Europe and North America, Africa remains central to the virus's long-term evolution and circulation. "One of the main reasons for the lack in local knowledge is that surveillance in many African countries remains limited and inconsistent," Dr Moir explained. "West Nile virus is endemic in Africa, meaning it is regularly circulating, but many infections probably go undetected or unreported."

The problem is compounded by the nature of the virus itself. "West Nile virus transmission is complex because it circulates silently between mosquitoes and birds long before people become ill," said Dr Moir. "Without routine monitoring, outbreaks can easily be missed."

The project brings together researchers from the Royal Veterinary College in the U.K., the University of Health and Allied Sciences in Ghana, the Pasteur Institute of Tunis in Tunisia, and the Kenya Medical Research Institute. Together, the consortium will investigate how the virus moves across ecosystems and regions, while also strengthening surveillance and research capacity across Africa.

"Emerging infectious diseases do not respect borders," noted Dr Moir. "Viruses move across countries and continents through complex ecological systems."

Across Ghana, Kenya, Tunisia, and South Africa, researchers will collect mosquitoes, screen them for the virus, and sequence viral genomes to understand how different strains evolve and spread. The project will also generate rare mosquito surveillance datasets – information that remains limited across much of Africa despite its importance for understanding transmission risk.

"These datasets are incredibly important because they allow us to move beyond simply detecting outbreaks and start understanding how the virus is spreading, evolving, and responding to environmental change," explained Dr Moir.

By combining mosquito data, viral genomic data, and climate information, the team hopes to identify transmission hotspots and better understand the environmental factors driving outbreaks. The team will also develop transmission risk maps across Africa. "The idea is to help public health systems move from reacting to outbreaks to anticipating them," said Dr Moir.

For her, one of the most important aspects of the project is its direct public health relevance. "We hope this work will not only advance scientific understanding of West Nile virus but also help develop stronger disease monitoring systems, better-informed public health policies, and improved preparedness for future disease threats across Africa," she said.

The project also includes a strong training and capacity-development component, supporting African public health researchers in advanced modelling and analytical approaches. "Building this expertise locally is important for long-term outbreak preparedness," Dr Moir noted.

For CERI, the grant further expands its growing work in genomic surveillance, epidemic intelligence, and One Health research. "CERI has already demonstrated the power of genomics in understanding and responding to infectious disease outbreaks," said Dr Moir. "This project further builds on that expertise in vector-borne diseases within a One Health framework."

She also sees the award as part of a broader shift in global health research. "I think the grant reflects growing international recognition of the importance of African-led research and collaboration in addressing global infectious disease threats," she said, adding that "Africa is central to the ecology and evolution of many emerging pathogens."

Over the next three years, the team aims to generate one of the largest genomic datasets for West Nile virus from Africa to date, while developing our understanding of the virus to support earlier detection and more informed outbreak response. The project also positions African researchers and institutions at the forefront of understanding how climate change is reshaping infectious disease risk across the continent.

Reconnecting Across the WEMA Network

Researchers and community partners from four African countries came together in Kenya to share findings and shape the next phase of WEMA's work on climate-related mental health and extreme weather.

text: **Dr Astrid Treffry-Goatley** photos: **Supplied by APHRC**

After a full day of travel from Cape Town to Johannesburg and finally Nairobi, we set out from Jomo Kenyatta International Airport at dusk, slowly making our way through the dense evening traffic of the city. Leaving Nairobi behind, we joined the busy A104 toward Naivasha – a road known for heavy traffic, fast-moving trucks and unpredictable overtaking. As darkness settled, the drive offered glimpses of villages, roadside markets and everyday life unfolding along the route before we finally arrived at the Great Rift Valley Lodge, where colleagues gathered for a late dinner before settling into the tree-top cabins scattered across the property.

The setting provided the backdrop for several days of meetings, planning and discussion as the WEMA Consortium and Scientific Advisory Board gathered in Naivasha in April 2026. Hosted by the African Population and Health Research Center (APHRC), around 30 researchers and community engagement team (CET) members attended from institutions including the Centre for Epidemic Response and Innovation (CERI), Africa Health Research Institute (AHRI), Comité para a Saúde de Moçambique (CSM), Centre de Recherche en Santé de Nouna (CRSN) and our hosts, the African Population Health Research Centre. I attened with Gill Black and Frank Tanser, on behalf of CERI.

For Gill Black and I, the meeting provided an opportunity to reconnect with the CETs we had worked alongside throughout 2025 during WEMA's digital storytelling (DST) workshops in Kenya, Mozambique, Burkina Faso, and South Africa. The CETs are experienced researchers and facilitators with backgrounds in social science, public health, participatory research, and community engagement, and several hold PhDs. Working across multiple languages and contexts, they have played a central role in leading WEMA's participatory work within their communities.

The DST workshops brought together community-based co-researchers (CBCRs) – community members directly affected by floods, cyclones and other extreme weather events – to create short digital stories exploring how these events have affected mental health and everyday life.

Since those initial workshops, the CETs have independently continued leading the next stages of the work within their communities. This has included participatory thematic analysis workshops, knowledge exchange sessions and collaborative discussions bringing community members, researchers and scientists together around broader WEMA findings.

One of the notable aspects of the project has been seeing different forms of evidence gradually brought together – community stories, prevalence surveys, climate data, systematic review findings, and long-term population health research. A key moment during the consortium meeting was the sharing of emerging findings from WEMA's cross-sectional prevalence surveys being conducted across the four countries. These surveys are exploring levels of depression, anxiety, and post-traumatic stress among populations exposed to extreme weather events. Hearing these early findings alongside the lived experiences reflected in the digital stories highlighted the complexity of climate-related mental health and the importance of drawing on multiple forms of evidence.

The consortium meeting also marked the transition into the next phase of the community engagement process: systems mapping and brainstorming workshops. During a session led by Collins Iwuji, CETs and researchers from each site worked together to map relationships between extreme weather events, mental health, social vulnerability, and potential interventions emerging through the project.

Using sticky notes, flipcharts and coloured pens, the groups mapped interventions ranging from community-led initiatives and partnerships between communities, NGOs and government structures, to broader state-driven responses. Discussions included peer-support initiatives, youth engagement activities, safer housing advocacy, food security support, mental healthcare access, and disaster preparedness strategies.

The teams then moved into stakeholder mapping exercises, identifying who should be included in the upcoming brainstorming workshops with policymakers, civil society organisations and local decision-makers. The aim is to ensure that ideas emerging through the project can contribute toward practical collaboration and action.

Community engagement is often described as a project activity. In practice, it requires ongoing collaboration, coordination and relationship-building across multiple countries, disciplines, and contexts.

Perhaps most importantly, this meeting highlighted how much WEMA has evolved since the first consortium meeting in 2024, when digital storytelling within the project was still largely conceptual. By the 2026 SAB meeting, the consortium was reflecting not only on completed workshops and emerging findings, but on a collaborative process that now connects community voices, scientific evidence, and stakeholder engagement across multiple African contexts.

Extreme weather is measured through climate data and prevalence surveys. But it is also experienced through uncertainty, displacement, stress, and disruption in everyday life. WEMA continues to explore what becomes possible when these different forms of evidence are brought together.

Scan this QR code to watch selected digital stories created by WEMA community-based co-researchers across the four participating countries.

Wastewater Insights from Accra

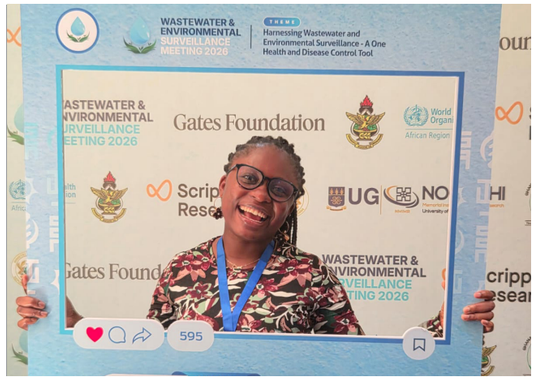
Two SACEMA postgraduate researchers share key lessons and new perspectives from the Wastewater & Environmental Surveillance Meeting 2026 in Ghana, highlighting the growing role of wastewater data in public health across Africa.

text: **SACEMA** photos: **Supplied**

Postgraduate students Comfort Jones and Emmanuel Ahenkan attended the Wastewater & Environmental Surveillance (WES) Meeting 2026, held in Accra, Ghana from 14–15 April 2026. The conference, themed *Harnessing Wastewater and Environmental Surveillance: A One Health and Disease Control Tool*, brought together researchers and public health practitioners from across Africa and beyond.

The programme spanned two focused days: the first covering scientific applications of wastewater and environmental surveillance – including epidemiological insights, catchment mapping, epidemic preparedness, and multi-pathogen approaches – and the second addressing integration and implementation, with discussions on linkages to clinical surveillance, sustainable scaling, and the future of the field.

For Comfort *(pictured below)*, whose Masters research is directly in this space, the event offered both affirmation and new perspectives. She was struck by the breadth of wastewater surveillance activity across the continent, noting how remarkable the progress has been given the real infrastructure challenges many African countries face, including limited sewer networks and data gaps.



"It was encouraging to see countries such as Ghana and Nigeria increasingly adopting the multi-pathogen approach to wastewater surveillance already well established in South Africa," said Comfort.

Presentations on wastewater signal interpretation were particularly valuable for her own work, especially in contexts where clinical data is unavailable. She was also pleased to hear talks dedicated to Hepatitis E virus (HEV), her specific pathogen of interest, with case studies from Uganda and Ghana offering new insights. She additionally had the opportunity to connect with colleagues from the NICD who are co-investigators on her research grant.

A key question that stayed with her from the event was how wastewater surveillance can be scaled up and how its findings can be translated into guidance that reaches policymakers and stakeholders.

For Emmanuel, the conference provided an opportunity to engage deeply with current developments in wastewater-based epidemiology and to share his own research. He presented a poster and received valuable feedback from fellow participants, while also spending time exploring other research projects showcased at the meeting.

"I learnt a lot from the presentations and panel discussions, particularly about diverse forms of environmental surveillance and the cost-effectiveness of wastewater-based approaches," he said. "I also had the opportunity to interact with experts working in this field and build valuable professional connections."

A particular highlight was participating in a group discussion on the early detection of epidemics – a topic closely aligned with his PhD research. "The discussion was very valuable," he said. "I contributed to and learnt from conversations on how to reduce the time to detection and response during epidemics and pandemics."

The experience reinforced the importance of integrating different surveillance systems to strengthen public health preparedness. Reflecting on the meeting, Emmanuel noted that the knowledge, feedback and professional networks gained would directly support his PhD research, particularly in relation to early warning systems, surveillance integration and the interpretation of wastewater data for public health decision-making.

Both researchers highlighted the value of the professional connections made and the broader perspective the conference provided on wastewater surveillance as a public health tool. Emmanuel has also donated his conference book to the SACEMA library so that colleagues can benefit from the latest research and developments in the field.

SACEMA's attendance was made possible through support from the Gates Foundation. We thank the Foundation for this investment in our researchers' development and congratulate Comfort and Emmanuel on representing SACEMA at this important regional gathering.

Sparking Scientific Curiosity

Grade 11 learners explore genomics through hands-on science.

text & photos: **Paul Harris**

KRISP recently welcomed 30 Grade 11 learners from IkamvaYouth's Chesterville branch for an engaging day of science, discovery, and inspiration as part of the DIPLOMICS Ignite national outreach initiative. The learners were introduced to the exciting world of genomics and scientific research through a combination of presentations, discussions, and hands-on activities.

Current KRISP students and researchers shared their academic journeys, providing valuable insights into university admission requirements, study opportunities, and bursary funding available to aspiring scientists. Learners also explored the role of DNA and viruses in health and disease, linking directly to concepts covered in their Life Sciences curriculum.

The highlight of the day was a series of practical activities designed to bring science to life. Learners extracted DNA from strawberries and used candy to design and build their own virus models, transforming complex scientific concepts into memorable learning experiences.

For learner Vusi Maundlane, the experience reignited a passion for science. "Today was such a constructive day. We learnt about DNA and even extracted it from strawberries. The experience has re-evoked my love for science," he said.

Fellow learner Thalente Mqono was equally inspired. "I've never really been interested in science before, but after today, I had so much fun and want to know more about science and how I can use it to help others."

Supported by DIPLOMICS Ignite and TIA, this programme aims to bridge the gap between classroom theory and real-world applications of genomics and next-generation sequencing. Through initiatives like these, KRISP hopes to inspire the next generation of scientists, innovators, and leaders who will help shape South Africa's future.

Hantavirus in Africa

Understanding hantaviruses today can help Africa build stronger systems to prevent and detect future outbreaks.

text: Prof Wolfgang Preiser, Prof Carla Mavian, Prof Cheryl Baxter, Dr Richard Lessells, Prof Tulio de Oliveria, and Maambele Khosa

Hantaviruses are not new. They have circulated for decades in rodent populations, particularly in rats and mice. Humans can become infected if they are bitten or scratched by a rodent or by inhaling aerosolised particles. These are tiny bits of rodent urine, faeces or saliva floating through the air that are contaminated by the virus.

There are many different hantaviruses but only one can spread from person to person: the Andes hantavirus from South America. This is the strain that recently killed several cruise ship passengers.

Infections between humans can be prevented by closely observing people who were exposed and isolating those who are sick. This limits the risk of further spread, as transmission generally requires close contact.

However, as an interdisciplinary group of scientists working on emerging infectious diseases, we argue that hantaviruses might pose a much bigger threat to African countries than currently known. We are concerned for three reasons.

Firstly, diagnostic testing capacity across much of the African continent remains limited. This is a real issue. In many rural settings, under-resourced diagnostic services may overlook sporadic cases. This may allow hantaviruses to spread without anyone noticing. Our medical expertise tells us that larger outbreaks are likely to be recognised eventually. But these delays in diagnosing the cases will slow down effective control measures.

Secondly, monitoring systems are lacking and likely to miss infections in wildlife and in human beings.

Thirdly, climate change and accelerating changes to the way land is used could increase the risk of spread of hantaviruses from animals to people. This is because global change may increase rodent populations and bring rats and mice into closer contact with humans.

For example, modelling studies in the Americas found broad zones with enzootic circulation (where an animal community always carries a certain disease). This is because many rodent species tend to live across a wide variety of environments where humans are also found. As human and rodent populations increase, the likelihood of encounters also increases. Some rodent species flourish in habitats shaped by humans or even in buildings. This poses a high risk for transmission of pathogens.

As a typical zoonosis (animal disease that spreads to humans), hantaviruses must be seen as a One Health issue. One Health is an approach that understands and takes into account the close connection between human, animal and ecosystem health. Hantaviruses cannot simply be seen as a clinical management or infection control issue.

It is really important that African governments set up better monitoring of wildlife so that they can detect when and where animal viruses like this are likely to spill over into the human population. This will help stop larger outbreaks of hantavirus, which can be deadly.

In Africa, scientists have discovered several hantaviruses, including Sangassou virus in Guinea in small mammal species, such as rodents. More recently, hantaviruses were found in shrews and bats too – not just in rats and mice as previously thought.

The fact that hantaviruses may circulate in a much wider range of animals and environments than scientists originally realised makes their ecology and potential spillover risk into humans more complex.

One of the current problems facing Africa is that there hasn't been enough research into the ecology of hantaviruses and which animals host them. There are very few genetic sequences available that would allow scientists to analyse interactions between viruses and hosts and the possible risk this poses to humans.

Combined with limited monitoring of the disease, Africa is experiencing a hantavirus surveillance gap. This gap needs to be closed because hantavirus infections and disease may be more widespread than many health systems assume.

Climate and land-use change influence rodent populations which host hantaviruses, and increase

human-rodent contact. Hantavirus boomed in the US between 1993 and 1995 because El Niño brought very heavy rains and warmer winters, which led to a bumper crop in seeds that rodents eat. This improved nutrition led to a massive increase in rodent numbers. Outbreaks elsewhere have likewise been linked to weather phenomena.

More rodents means more of them seeking food and shelter in the vicinity of humans. More competition for resources leads to more aggressive behaviour between animals and biting transmits the virus. Because El Niño episodes are predicted to become more frequent and intense in future, hantaviruses are likely to affect African countries more and more.

In Africa, land-use change is likely to play an increasingly important role in hantavirus ecology and emergence, as was the case with Lassa fever (another virus spread by rodents) in Nigeria and Guinea. Deforestation, agricultural expansion, mining activities, road construction and urban growth are transforming natural habitats across many regions of the continent. These environmental changes can force populations of rodents, shrews and bats to move into farms, villages, peri-urban settings and water sources used by people.

When humans expand into previously undisturbed habitats in search of land, food, or economic opportunity, this also creates a new opportunity (known as an ecological interface) where hantaviruses and other zoonotic pathogens may circulate more easily between wildlife reservoirs and humans.

When people and wildlife come into close contact, viruses like Andes can jump from animals and begin transmitting between humans. Hantaviruses can cause severe human disease and this is likely far more widespread than currently recognised.

Fortunately, the risk of Andes hantavirus spreading beyond the cruise ship passengers and crew and their close contacts is small. But Sars coronavirus and monkeypox virus are recent examples that some zoonotic viruses have the potential to spread rapidly and widely among humans.

Virological and ecological studies of wildlife reservoirs and surveillance of possible hantavirus infection and disease in humans in endemic regions are needed. This requires specialised diagnostic tools combined with samples from rodents in areas where humans have disturbed their habitat and have since experienced unexplained febrile illness (acute high fevers).

Once there is firm evidence of human disease, scientists and medical professionals will be able to argue for the widespread use of diagnostic tests. The results of these tests will determine how much of a threat the virus poses to human health.

Genetic sequencing and data-sharing partnerships can then help connect animal, environmental and human signals into a clearer picture of risk.

The greatest gap currently may be the failure to identify where, how, and under which environmental conditions spillover events occur before outbreaks emerge.

Strengthening surveillance to identify high-risk interfaces, emerging transmission zones, and drivers of spillover is therefore essential to anticipate potentially pathogenic African hantaviruses before larger outbreaks occur.

Building Better Ways to Diagnose Disease in Africa

I came to Stellenbosch to help build African solutions for African challenges.

text: **Joel Kabugo** photo: **CERI Media**

For me, home is Uganda. This is where my work is rooted – in the realities of clinical care and public health systems, with a clear focus on implementation.

As a clinical microbiologist and infectious diseases research scientist, my main goal has always been to expand access to laboratory diagnostics through operational research and health system strengthening.

Over the past decade, I have contributed to how Uganda diagnoses and responds to diseases such as tuberculosis, HIV, and SARS-CoV-2, playing a direct role in national disease response strategies.

At the centre of my work are three core public health challenges in Africa: increasing antimicrobial resistance, inequitable access to diagnostics, and limited global representation in genomics research. That imbalance is significant. Africa carries a large share of the global disease burden, yet contributes less than two percent of genomic data. For me, this shapes how diseases are understood, how outbreaks are tracked, and how responses are designed.

My work focuses on practical shifts within these systems. Between 2024 and 2025, I led the rollout of stool testing as an alternative method for diagnosing tuberculosis in children, an approach that helped identify cases that would otherwise have been missed. This contributed to closing the gap of missed children who would go undetected for TB.

My decision to come to Stellenbosch University through the African STARS Fellowship at the Centre of Epidemic Response and Innovation (CERI) was shaped by how closely the programme aligned with the gaps I had experienced. I saw a deliberate design for the exact gaps that exist in our national laboratory systems back home.

The fellowship, supported and sponsored by the Mastercard Foundation, brings together mentorship, research management, biotechnology entrepreneurship, and exposure to advanced infectious disease research

– areas that are often not addressed together in resource-limited settings.

My experience in South Africa has been smooth, shaped by multidisciplinary and multicultural teams that are open and willing to share knowledge, alongside access to laboratories and practical working resources. What stood out most for me were seminars focused on scaling healthcare in Africa. They addressed the actual problems we face from Uganda to other African countries and laid out applicable solutions that have worked in one setting and can be translated to where I come from.

For me, this is what being “In Africa, for Africa” looks like in practice. It’s about empowering the African child to lead research and innovation that is translatable to African problems. My current work focuses on contributing baseline genomic and immunological data on HIV reservoir size, particularly in children, with the aim of supporting future HIV cure research built on African data. While rooted in Uganda, my work is ultimately about ensuring that fewer children are missed, and that diagnosis reaches those who need it most.

Finding Belonging in the Small Moments

A journey from Kenya to Stellenbosch.

text: **Celestine Kemunto Nyamari** photo: **CERI Media**

Kenya is home for me. It is where my family is, where I first discovered my passion for science, and where many of the questions that continue to shape my research began. My background is in Molecular Biology and Biotechnology, and my work has focused on some of Africa’s most pressing health challenges, particularly infectious diseases and cancer.

What motivates me most is the belief that science should improve lives in practical and accessible ways. In Kenya, I helped establish molecular diagnostic laboratories, strengthening local diagnostic capacity and showing me how transformative locally built scientific infrastructure can be for African healthcare systems.

Today, my research focuses on cervical cancer and Human Papillomavirus (HPV), the virus responsible for nearly all cervical cancer cases. I am also driven by the need to address the underrepresentation of African populations in genomics and precision medicine research. African health challenges require solutions informed by African data, African realities, and African-led research.

I came to Stellenbosch University through the Africa STARS programme, and what immediately stood out was its culture of innovation and collaboration. Researchers are encouraged to think beyond publications and towards meaningful impact. Through the fellowship, I have explored biotechnology innovation beyond my core research area, including enzyme production and entrepreneurship. These experiences have expanded the way I think about science as a pathway to locally driven diagnostic and therapeutic solutions for Africa.

Settling into Stellenbosch was not always easy because it meant leaving my family behind in Kenya. As a mother and a scientist, balancing personal responsibilities with professional growth has been challenging. What made the transition easier was the people.

The Africa STARS fellows were welcoming from the beginning, and shared experiences quickly became genuine friendships and a sense of community. Sometimes belonging was found in simple moments – conversations after work, shared meals, or going for runs together. The staff at CERI and the International Office were equally supportive. Through these experiences, I realised that belonging is not always about geography. Sometimes it is created through shared purpose and human connection.

For me, this experience reflects what “In Africa, With Africa, For Africa” truly means. It means African scientists leading research that addresses the needs of African communities and building sustainable scientific systems within the continent. It also means working together across borders. My journey from Kenya to Stellenbosch has shown me the power of pan-African collaboration and what becomes possible when scientists share knowledge, ideas, and expertise towards common goals.

I hope my research contributes to a future where African women benefit from more context-specific approaches to disease prevention, diagnosis, and precision medicine. I also hope to help strengthen scientific capacity, biotechnology innovation, and research ecosystems that will support future generations of African scientists. In doing so, I hope to play a small part in ensuring that more African researchers can lead discoveries and innovations that improve health outcomes across the continent.

Global Surveillance Networks

A new paper co-authored by CERI's Prof Houriiyah Tegally explores how connected data systems could strengthen infectious disease surveillance and outbreak response worldwide.

Newly published paper, *Global approaches to infectious disease surveillance and modeling*, in Nature, is co-authored by Prof Houriiyah Tegally, Head of the Data Science Unit at the Centre for Epidemic Response and Innovation. It explores how metagenomic surveillance and data integration could transform the way the world detects, tracks, and responds to infectious disease threats.

The paper introduces PathogenGlobal, a framework designed to connect fragmented viral data sources across regions, institutions, and disciplines, creating a more coordinated picture of pathogen emergence and spread. By linking genomic data, environmental sampling, modelling approaches, and public health information, the framework aims to improve early warning systems, strengthen outbreak preparedness, and support faster, more informed public health responses.

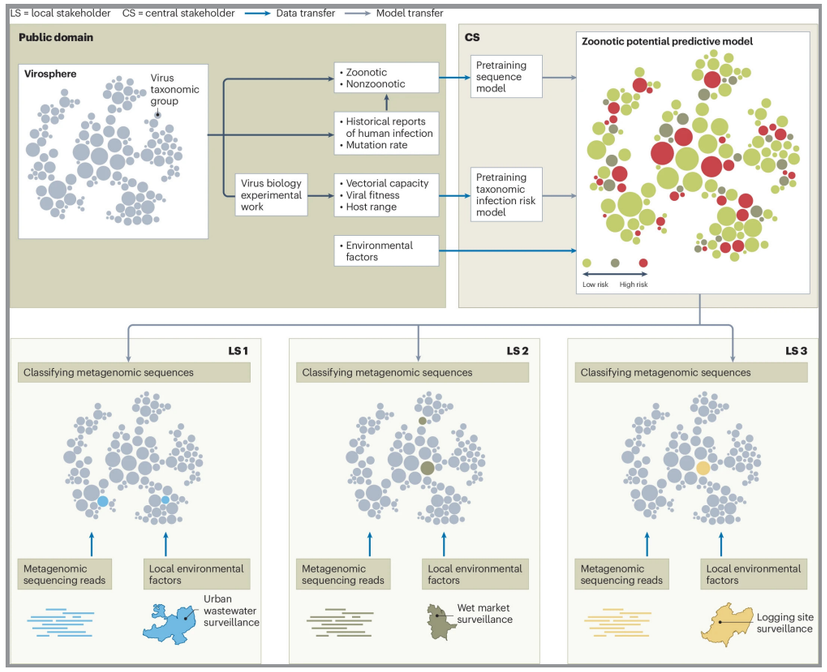
The work addresses a major challenge in global health: surveillance data are often scattered across different systems, formats, and organisations, making it difficult to build a complete picture of emerging threats. The authors argue that greater integration, shared infrastructure, and international collaboration will be essential for responding effectively to future epidemics and pandemics.

ABSTRACT

Human mobility, climate change and demographic trends increase the risk of pathogen spillover and expansion. Data that can inform our responses to outbreaks have increased in availability and volume, but access to highly confidential outbreak data and commercially sensitive contextual information remains difficult. Despite ongoing efforts to adopt global health data infrastructures and sharing protocols, there remain regulatory, logistical, human and computational barriers to data sharing. Federated approaches – in which data remain under local control while enabling collaborative analysis – offer a promising solution. This paper presents PathogenGlobal, a framework for integrating diverse infectious disease data sources to support surveillance, modelling and public health decision-making at a global scale. Through improved interoperability, governance structures and collaborative networks, PathogenGlobal aims to strengthen preparedness for future epidemic and pandemic threats.

For access to the full publication, visit: https://www.nature.com/articles/s41591-026-04351-4

Figure 2 (right): *Current and publicly available knowledge of the virosphere, including genetic data, can be aggregated and combined with experimental work to produce information about key biological features related to cross-species transmission (top left). A central stakeholder can combine this published information to train models linking genetic sequence data (that is, genetic determinants of host specificity) and infection risk data, which are ultimately integrated into a large taxonomic zoonotic potential predictive model (top right). Local stakeholders could run local instances of the model to query locally produced metagenomic sequence data from different surveillance schemes (bottom panels).*



CERI Fellows Reunion

In 2026, CERI celebrates five years as Africa's leading centre for epidemic response and genomic innovation. In that time, close to 900 fellows have been trained across the African STARS programme and CERI's wider capacity building initiatives; scientists, epidemiologists, bioinformaticians, and public health leaders now working across the continent.

In September, for the first time, CERI will host its own segment at the Stellenbosch University Annual Homecoming Weekend. The CERI Fellows and African STARS Reunion takes place on Saturday 12 September 2026 at Postcard Café, Jonkershoek; an exclusive gathering of 60 fellows and alumni for a morning of networking, peer connection, and collective reflection on where African science goes next.

Click here to get tickets: https://www.quicket.co.za/events/374391-ceri-fellows-african-stars-reunion#/

Why African Microbiomes Matter

Africa's extraordinary biodiversity holds vast untapped microbial diversity, yet less than 3% of the world's microbial species have been characterised and African microbiomes remain largely absent from global datasets. A new research chair at Stellenbosch University aims to change that by advancing African-led microbiome science, building research capacity across the continent, and generating the knowledge needed to address challenges in health, agriculture, food security, and environmental sustainability.

text: **SU Media** photo: **Peartree Photography**

Prof Thulani Makhalanyane *(pictured above, in the middle of the front row)* with his team – a large research group in African microbiome research in the Department of Microbiology at Stellenbosch University, consisting of eight postdoctoral fellows, six BScHons, thirteen MSc, and nine PhD students. The group is also strategically aligned with SU's School for Data Science and Computational Thinking, thereby strengthening computational and systems biology skills within microbiome science in Africa.

"Africa's immense genetic diversity and environmental variability make microbiome research an urgent priority."

– **Prof Thulani Makhalanyane**

Africa's unparalleled biodiversity and environmental variations present an extraordinary opportunity to explore novel microbial species and their functions. Yet African microbiomes are conspicuously absent from global datasets, with less than 3% of microbial diversity characterised to date.

This knowledge gap will now be addressed by a new research chair at Stellenbosch University, led by Prof Thulani Makhalanyane, a leading international microbiologist and advocate for why African microbiomes matter. He also leads the African Microbiome Project – a pan-African effort to reduce the knowledge deficit regarding African microbiota by sequencing 10 million samples.

The South African Research Chair (SARChi) in African Microbiome Innovation is part of an initiative by the Department of Science, Innovation and Technology (DSTI) and the National Research Foundation (NRF) to attract and retain top researchers at South African public universities.

Prof Makhalanyane is well-known for advocating the significance of and the vital role of microbiomes in health, agriculture, and environmental sustainability, particularly within the African context. Yet African microbiomes remain critically understudied: "This knowledge deficit is particularly concerning given Africa's immense genetic diversity, environmental variability, and susceptibility of global challenges such as climate change, infectious diseases, and food insecurity," he says.

"Current microbiome research is disproportionally concentrated in the global North, limiting the applicability of findings and impeding the development of context-specific solutions tailored to African systems. This disparity underscores the urgent need for dedicated research initiatives that prioritise African microbiomes, generating foundational datasets to inform science, policy and innovation," he continues.

Furthermore, there is a critical need to strengthen research capacity and infrastructure in this field across the continent, ensuring that African scientists lead efforts that are relevant to African priorities. One of the main objectives of the new research chair will be to equip postgraduate students with the necessary skills in computational and systems biology within microbiome science. This will include the promotion of bioinformatics and machine learning in microbiome analysis, the creation of open-source computational toolkits tailored to African datasets, and the development of short courses in microbiome data science and microbial informatics.

According to Prof Makhalanyane, his vision is to expand institutional research capacity and to foster a new cohort of computationally skilled microbiologists across Africa.

Prof Sibusiso Moyo, Vice-Chancellor: Research, Innovation and Postgraduate Studies at SU, says the establishment of an NRF-SU chair on African microbiomes at SU comes at the right time when the University has just had its Research and Innovation Blueprint 2030 and Strategy Plan 2026-2030 approved.

"By leveraging existing investments in genome sequencing and computational infrastructure at Stellenbosch University, this initiative will position Africa as a leader in microbiome science rather than merely a data source for global research efforts. There is also an expectation of the Chair to continue internal and external collaborations," she noted.

Prof Bertie Fielding, Dean of the Faculty of Science at SU, says the chair will close a critical gap in global microbiome research by ensuring that African microbial diversity is studied, understood and led from Africa: "Prof Makhalanyane's work will be important for advancing science, building capacity and supporting solutions in health, agriculture and environmental sustainability," he added.

Why microbial community research?

The community of bacteria, archaea, fungi, and viruses found in a particular environment is called its "microbiome". Combined, they may have profound roles as regulators of human health and ecosystem functions. Initiatives such as the Human Microbiome Project and the African Biogenome Project have provided us with insights regarding the diversity and functions of these communities. For instance, several studies have demonstrated that microbes have the capacity to control food cravings, behaviour, and susceptibility to disease in animals. In soils, microbial communities control carbon sequestration, nutrient recycling and organic matter decomposition.

It is important to note, however, that there are large gaps in our understanding of the microbiome. There are several reasons contributing to this knowledge deficit. For example, most microorganisms are not easy to isolate in the laboratory. Current estimates suggest that less than 3% of microbial communities have been validly characterised. Some estimates suggest that several billion microorganisms remain uncharacterised, across a variety of ecosystems and hosts. In addition, current studies suggest that microbiota may vary considerably over local, regional, and global scales.

To reduce this knowledge deficit, we urgently need to investigate the diversity and functional attributes of microbial communities across diverse ecosystems, and particularly in Africa.

Reading Viral Genomes

The Virus Evolution and Molecular Epidemiology (VEME) Workshop, taking place 6–11 September 2026 in Stellenbosch, is designed to help researchers move beyond generating genomic data to understanding what it means. Through hands-on training in phylogenetics, evolutionary analysis, and outbreak investigation, participants learn how to translate viral genome data into insights that can support research, surveillance, and public health decision-making.

text: **Katrine Anker-Nilssen** photos: **CERI Media & Supplied**

For many researchers working with viral genomes, the challenge is no longer generating sequence data – but rather understanding how to analyse and interpret it meaningfully. And this is the exact gap that the Virus Evolution and Molecular Epidemiology (VEME) Workshop is designed to address.

Hosted annually by leading international researchers in evolutionary genomics and molecular epidemiology, and supported through networks linked to the Centre for Epidemic Response and Innovation (CERI) at Stellenbosch University, VEME focuses on how genomic data can be translated into real-world public health insight – from understanding outbreak dynamics, to tracking viral evolution and transmission patterns.

Over six intensive days, participants work through end-to-end analytical workflows used in infectious disease genomics. Rather than approaching phylogenetics as abstract theory, the workshop emphasises how tools and models are applied in practice to address real-world public health challenges.

Participants begin with the fundamentals of building phylogenetic trees from sequence data, using widely adopted tools such as IQ-TREE and BEAST. Alongside learning how to run analyses, the workshop places strong emphasis on understanding model selection, uncertainty, and the biological meaning behind different evolutionary assumptions.

Professor Philippe Lemey *(pictured left)*, a Belgian evolutionary biologist and bioinformatician based at KU Leuven, has been teaching at VEME for more than two decades. “I have been involved since I first participated in 2001. For over 10 years, I have organised the hypothesis testing module at VEME,” he says.

Internationally recognised for his work in phylogenetics, molecular evolution, and infectious disease dynamics, Prof Lemey’s research focuses on developing computational and statistical approaches to understand how viruses evolve and spread.

For this year’s VEME workshop, which will take place from September 6 to 11 at Bertha Retreat in Stellenbosch, one of the most important skills he hopes participants will take away is the ability to navigate complex Bayesian statistical analyses for phylodynamics. “Rather than treating Bayesian phylodynamics as a black box, the workshop should provide participants with a sufficient understanding of its inner workings, as well as the background and confidence needed to use these methods in practice,” he explains.

The analytical approaches taught at VEME have become increasingly important in modern outbreak response. During epidemics, phylogenetic and phylodynamic analyses can help researchers understand how pathogens are spreading, identify emerging variants, reconstruct transmission patterns, and support public health decision-making in near real time. As genomic sequencing capacity continues to expand globally, the ability to interpret and contextualise these datasets has become just as important as generating them.

The workshop therefore moves beyond tree building into more advanced evolutionary hypothesis testing, where participants explore questions around viral spread, adaptation, and transmission dynamics. Practical examples mirror real research problems – such as determining whether a virus is evolving under selective pressure, or reconstructing the timing and geographic movement of outbreaks.

A major focus throughout the course is workflow integration. Participants are guided through the full analytical process, from sequence alignment and quality control to phylogenetic reconstruction and interpretation within public health and research settings.

For participants such as Ambroise Ahouidi, a Senegalese researcher specialising in malaria genomics at the Institut de Recherche en Santé, de Surveillance Épidémiologique et de Formation (IRESSEF) in Dakar, VEME provides an opportunity to strengthen the analytical skills increasingly needed for genomic surveillance across Africa.

Ahouidi’s work focuses on malaria parasite diversity, transmission dynamics, immunity, and antimalarial drug resistance in West Africa, using genomic and molecular approaches to support disease surveillance and public health responses.

“Generating genomic data is becoming increasingly accessible, but interpreting that data correctly remains a major challenge,” notes Ahouidi. “Workshops like VEME are important because they help researchers develop the analytical skills needed to translate genomic information into meaningful public health insight.”

He adds that understanding evolutionary dynamics and transmission patterns is becoming increasingly important for infectious disease surveillance across the continent. “Training in these analytical approaches strengthens our ability to respond more effectively to emerging disease threats in Africa,” notes Ahouidi.

For CERI, workshops such as VEME form part of a broader commitment to strengthening genomic surveillance and bioinformatics capacity across Africa. By bringing together researchers, facilitators, and participants from multiple countries and disciplines, the workshop helps build the analytical expertise and collaborative networks needed to support future outbreak preparedness and response.

As genomic surveillance becomes increasingly central to epidemic preparedness, these initiatives are helping build the expertise needed to interpret complex pathogen data rapidly, rigorously, and in ways that can meaningfully support public health action.

African Innovation with Global Impact

African STARS fellow Kennedy Mulungu is turning scientific innovation into real-world impact, taking ideas from Malawi to global platforms.

text: **Katrine Anker-Nilssen** photos: **CERI Media, Leo Burnett & Supplied**

Selected from more than 900 international applicants as one of only 10 young innovators invited to the United Nations Science, Technology and Innovation Forum in New York, African STARS fellow Kennedy Mulungu is emerging as part of a new generation of African scientists and entrepreneurs building globally competitive innovation from the continent.

When Kennedy stood at the United Nations headquarters earlier this year, it marked a significant milestone in his growing work across biotechnology, entrepreneurship, and product innovation. “Personally, it was a profound affirmation that African innovators from countries like Malawi can compete and contribute meaningfully at the highest global levels,” he says. “Professionally, it positioned me within elite international innovation ecosystems where science, entrepreneurship, and policy intersect.”

A major foundation behind that trajectory, Kennedy says, has been the African STARS Fellowship, supported by the Mastercard Foundation and led through Centre for Epidemic Response and Innovation (CERI) at Stellenbosch University and Centre for Africa’s Resilience to Epidemics (CARE) at Institut Pasteur de Dakar. “African STARS has been the foundation of my transformation from scientist to entrepreneur,” he notes. “It equipped me with critical skills in innovation commercialisation, venture building, leadership, and product-market strategy.”

Kennedy says the fellowship also opened access to entrepreneurial ecosystems, strategic mentorship, and global opportunities that directly shaped his development and international exposure. “It exposed me to world-class entrepreneurial ecosystems, strategic networks, and global opportunities, directly preparing me for competitive platforms like the United Nations STI Forum, LEA-WH Fellowship, and Excellentium,” he says. “African STARS has been instrumental in shaping my ability to translate innovation into scalable enterprise and global impact.”

The UN forum itself created opportunities to engage directly with institutions shaping the future of global innovation, including the World Intellectual Property Organization (WIPO) and the American Society of Mechanical Engineers (ASME). These engagements also shaped how he thinks about innovation and commercialisation.

“WIPO’s emphasis on translating ideas into protected, investable enterprises strongly aligned with my entrepreneurial ambitions,” he says. “Engagement with ASME provided insight into engineering commercialisation, manufacturing scalability, and practical frameworks for moving technical innovations from prototypes to impactful real-world solutions.”

That thinking now underpins his work in Malawi. “I am a scientist, entrepreneur, and innovation leader passionate about building ventures that solve real African challenges through biotechnology, entrepreneurship, and scalable product development,” he says. “My journey is driven by the belief that science must move beyond research into sustainable enterprises capable of creating meaningful impact.”

Through Ubhwando Group Limited, Kennedy has led sexual and reproductive health initiatives in rural Malawian communities, focusing particularly on youth and women’s health. The work includes awareness programmes, community-based initiatives, and innovation-driven projects addressing menstrual health and access to essential health products.

Alongside this, he is developing alginate-based biodegradable sanitary pads and wound dressings through his Kelp Alginate project, which he aims to commercialise in Malawi.

“I am focused on bridging critical gaps in African innovation ecosystems by transforming scientific discoveries into locally built, commercially viable products that address pressing health, manufacturing, and development challenges,” he says.

Kennedy says his entrepreneurial focus emerged through firsthand exposure to persistent healthcare and access challenges across underserved communities. “Direct exposure to unmet healthcare, manufacturing, and access challenges within African communities revealed the urgent need for locally driven innovation enterprises capable of delivering scalable solutions,” he explains. “I have witnessed persistent gaps in healthcare access, product affordability, and innovation penetration. This reinforced the importance of entrepreneurship models tailored to underserved African populations.”

Kennedy’s approach combines scientific rigor with commercialisation strategy. “I emphasise local manufacturing, sustainability, intellectual property development, and long-term venture scalability,” he says.

His work recently gained further recognition through his acceptance into the LEA-WH Fellowship Innovation Track. “The LEA-WH Fellowship Innovation Track is one of Africa’s most prestigious and competitive leadership platforms focused on advancing health innovation, women’s health solutions, and entrepreneurship across the continent,” Kennedy explains.

“What makes LEA-WH particularly powerful is the caliber of institutions driving it – the U.S. National Academy of Medicine and KEMRI – alongside other global and African strategic partners,” he says. “For entrepreneurs like myself, this means access to leadership development, commercialisation and funding support, strategic mentorship, scientific visibility, and global networks necessary for product deployment.”

Later this year, he will also join Excellentium 2026 in France, a global biotechnology leadership platform focused on the future of biotech innovation.

Looking ahead, Kennedy believes Africa’s innovation future will depend on stronger support systems for innovators. “Africa’s innovation future depends on stronger commercialisation ecosystems, intellectual property systems, investment access, manufacturing capacity, mentorship, and policy environments,” he says. “We need systems that enable innovators to move products from laboratories into markets at scale.”

***BELOW (from left)**: Kennedy Mulungu in Nairobi Kenya, with LEA-WH fellows Gellila Biresaw Sime (Ethiopia) and Dr Kenneth Toby Maduako (Nigeria).*

Accelerating Africa's Vaccine Future

A new grant is helping African STARS Fellow Dr Monique Barnard-Matthee build the automation systems, expertise, and infrastructure needed to strengthen African-led vaccine development and production.

text: **Katrine Anker-Nilssen** photo: **Peartree Photography**

For Dr Monique Barnard-Matthee, some of the most important work in vaccine development happens in the systems behind the science: the workflows, infrastructure, automation platforms, and quality control processes that determine whether a promising scientific breakthrough can actually become a reliable public health solution. She believes that work must happen in Africa, led by African scientists, using African expertise.

That vision recently received a major boost when Monique was awarded a three-year Research Infrastructure Professionals Programme (RIPP) grant from the National Research Foundation (NRF), focused on advanced automation systems for mRNA vaccine research and production.

The grant centres on training with the Stellenbosch Biofoundry's Tecan Fluent® automation system, a state-of-the-art platform designed for advanced bioengineering workflows – currently the only system of its kind in Africa.

"The project focuses on two of the most pressing challenges in Africa's mRNA vaccine manufacturing process: improving quality control for locally produced in vitro transcription enzymes, and making DNA template production faster and more reliable," explains Monique. "By introducing laboratory automation, we aim to streamline how enzyme quality is assessed, reducing reliance on imported reagents while ensuring that locally produced materials consistently meet international standards."

Monique says that although vaccine development often gets the most attention, the reality is that you cannot produce a vaccine without first having reliable access to the raw materials that go into making it. "In Africa, that supply chain has historically been fragile and heavily dependent on imported enzymes, reagents, and other critical inputs that can be delayed, made scarce, or priced out of reach during the very moments we need them most.

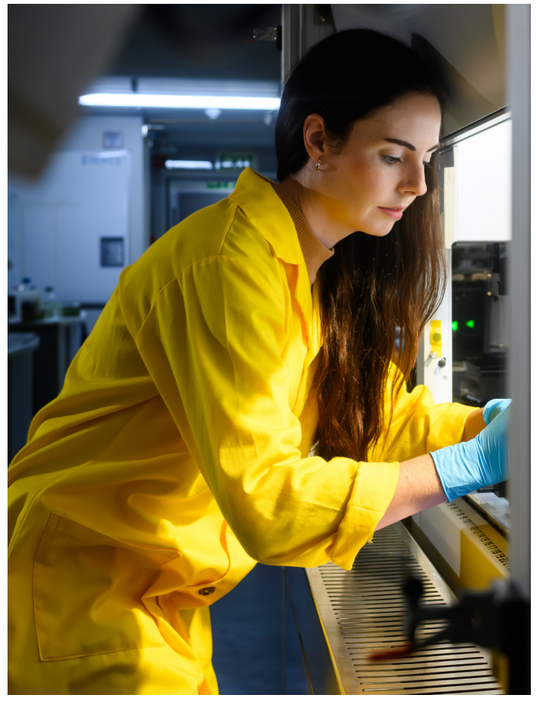
"Addressing those bottlenecks is not glamorous work, but it is absolutely foundational," she reflects. "When we invest in building robust local capacity for producing and quality-checking these materials, we are essentially laying the groundwork for a continent that can respond to health threats on its own terms."

At the centre of this effort is the Stellenbosch Biofoundry's Tecan Fluent® automation technology. "What really energises me is the combination of flexibility and precision the system brings," says Monique. "Our automation system takes processes that are typically time-consuming, costly, and prone to human error, and transforms them into fast, precise, and reproducible workflows."

The platform allows researchers to automate multiple stages of laboratory work on a single deck, significantly improving speed, reproducibility, and quality assurance while reducing reagent use and operational costs. "In the context of vaccine development, where accuracy and speed can genuinely save lives, this is an incredibly powerful thing to have access to on African soil," says Monique.

But beyond the technology itself, Monique sees the project as part of a much broader shift in how science on the continent positions itself globally. "If the COVID-19 pandemic taught us anything, it is that depending on the rest of the world to solve our health problems is a vulnerability we can no longer ignore," she says. "When we invest in building genuine local expertise in technologies like automation and mRNA systems, we start becoming architects of our own health security."

That shift toward African-led scientific capacity is



something deeply connected to her experience as an African STARS Fellow – a programme implemented by the Centre for Epidemic Response and Innovation (CERI) at Stellenbosch University and the Center for Africa's Resilience to Epidemics (CARE) at the Institut Pasteur de Dakar in partnership with the Mastercard Foundation.

The fellowship focuses not only on scientific training, but also on leadership development, collaboration, confidence-building, and strengthening the long-term foundations required for sustainable scientific impact across the continent. This aligns closely with the Mastercard Foundation's broader impact vision of supporting young people to secure dignified and fulfilling work while strengthening institutions, resilience, and long-term change across Africa.

"The African STARS Fellowship built the scientific foundation and sense of purpose that has driven every opportunity since," she says. "What the fellowship instilled in me above all else was the understanding that Africa's health challenges deserve African-led solutions, and that as scientists on this continent, we are not just participants in that process, but its driving force."

Working alongside other early-career African researchers also reshaped how she understood leadership and her own place within science. "One of the biggest things the fellowship showed me is that being a good scientist and being a good leader are not separate things," she says. "You cannot really have one without the other."

Working alongside other young African researchers who were just as passionate and driven as she is, made Monique realise that the continent is not short of capable people – it is short of opportunities for those people to be seen and heard. The experience also strengthened her confidence in ways she had not anticipated. "On a personal level, it pushed me out of my comfort zone, and I came out of it far more confident in my own voice and my own judgment."

Fulfilling work has always meant science with a reason behind it, for Monique. "Not research for its own sake, but because I genuinely believe it can change lives," she explains. "So I made a choice to direct my work toward the continent. Not out of obligation, but because it felt like the only honest use of what I'd been given."

Her growing international recognition reflects this. Earlier this year, Monique received an NRF KIC travel grant to attend and present at the fourth International Conference on Vaccine Research and Development in Paris, where global experts discussed next-generation vaccine platforms, pandemic preparedness, AI-driven vaccine research, and emerging technologies shaping the future of global health. "I really enjoyed the opportunity to network with experts in this field and to meet different researchers from different countries doing exceptional work," she says.

But her focus remains firmly rooted in African scientific ecosystems and public health realities. "There is a tendency in research to measure success purely by publications and discoveries," she reflects, "but what I have come to appreciate is that some of the most valuable contributions you can make are the ones that create space for others to thrive – building the right systems, developing the right skills, and leaving behind something more capable than what you inherited."

She believes the long-term impact of projects like this reaches far beyond laboratories. "For young scientists, it means having something real to work toward locally – actual skills, actual infrastructure, and actual opportunities that do not require packing up and leaving the continent to find," she says. "For health systems, local production and quality-assured materials mean faster turnaround and lower costs when outbreaks hit, which is the difference between an adequate response and a catastrophic one," she says – adding that for the communities who depend on these health systems, it means that the next time a crisis comes, Africa is not caught off guard.

"In the near future, I would love to look back and say that we built something that actually works and that people rely on – a system that runs smoothly and meets international standards," she says. "On a bigger scale, I hope this contributes to a gradual but real shift in how Africa shows up in the global vaccine conversation."

Strengthening Africa's Outbreak Preparedness

Through cutting-edge viral sequencing training at CERI, African researchers are strengthening the continent's outbreak preparedness and surveillance networks.

text: **Katrine Anker-Nilssen** photos: **CERI Media, Charlie Sperring**

As emerging and re-emerging viruses continue to shape global public health, the ability to rapidly detect and characterise pathogens has become increasingly important, particularly in regions where surveillance resources remain unevenly distributed. Earlier this month, scientists, laboratory professionals, and public health researchers from across Africa gathered at the Centre for Epidemic Response and Innovation (CERI) at Stellenbosch University for an intensive hands-on workshop focused on one of the field's most advanced viral sequencing approaches: VirCapSeq-VERT.

Hosted from 4–12 May at CERI's laboratory facilities in the Biomedical Research Institute, the workshop brought together participants from the University of Fort Hare, Sefako Makgatho Health Sciences University, the University of Pretoria, the Eswatini National Public Health Laboratory (NPHL), the Ethiopian Public Health Institute, and the University of Rwanda.

The training was supported by the Skoll Foundation and Columbia University's Global Alliance for Preventing Pandemics (GAPP).

Focused on the complete VirCapSeq-VERT workflow – a capture-based metagenomic sequencing approach designed to detect all known vertebrate viruses from clinical or environmental samples – the workshop trained participants across both laboratory and bioinformatics workflows, including cDNA synthesis, library preparation, hybridisation capture, sequencing preparation, data quality control, and downstream genomic analysis.

Unlike traditional diagnostic workflows, which typically rely on targeted PCR tests or pathogen-specific sequencing assays, VirCapSeq-VERT offers a far broader surveillance capability. Dr Marije Hofstra from CERI explained that conventional systems are often limited to detecting only pathogens laboratories are already specifically looking for.

"The PCR screening will only detect a limited number of pathogens," said Dr Hofstra. "For every pathogen that you would like to be able to sequence, the laboratory needs to develop, evaluate and implement an assay."

VirCapSeq-VERT approaches the problem differently. Using a probe set containing nearly one million probes targeting viruses known to infect vertebrates, the method enriches viral genetic material before sequencing, significantly improving the ability to detect and characterise viruses – even when they are present at very low levels. "The assay is able to sequence any virus that is known to infect vertebrates within a single laboratory workflow," Dr Hofstra explained. "It also allows for variability in the virus, so it should still be able to pick up novel strains."

This has major implications for surveillance, particularly in settings where laboratories may not yet have dedicated assays for every circulating pathogen. "Once a laboratory has implemented this single assay, it has immensely expanded its capacity to detect and characterise any viral pathogen, without the requirement to know in advance which virus you are looking for," said Dr Hofstra.

The ability to detect unexpected or previously unknown pathogens is increasingly important for epidemic preparedness. Dr Lavanya Singh, Head of Laboratory at CERI, said the workshop directly addressed a critical gap in outbreak detection and genomic surveillance across Africa.

"Traditional diagnostic systems often depend on targeted tests that only identify known pathogens, leaving outbreaks caused by novel or unexpected viruses undetected," she said. "This workshop equipped participants with practical skills in viral metagenomics and targeted enrichment approaches, improving the ability of laboratories to strengthen outbreak preparedness, early-warning surveillance, and genomic monitoring of emerging infectious diseases across Africa."

Dr Singh added that hosting the training at CERI was equally important from a capacity-building perspective. "Africa faces a high burden of emerging and re-emerging infectious diseases, yet access to specialised metagenomic training and sequencing technologies remains uneven across the continent," she noted. "By bringing researchers, virologists, and public health professionals together in an African centre of excellence, the workshop promoted regional collaboration, skills transfer, and sustainable genomic surveillance capacity tailored to African public health priorities."

For many of the facilitators, the workshop was also about building long-term local expertise and strengthening regional scientific networks. Lucious Chabuka, CERI's Laboratory Manager, said local capacity-building remains essential for strengthening independent outbreak response systems.

"Developing local expertise in sequencing, bioinformatics, data interpretation, and laboratory workflows reduces reliance on external laboratories, shortens turnaround times, and improves outbreak preparedness and surveillance capacity," he said.

Chabuka also noted that bringing together participants from different institutions and countries created opportunities for knowledge exchange and future collaboration. "Scientists and laboratory professionals from different backgrounds often face unique challenges related to infrastructure, resources, and disease burdens," he said. "Sharing practical solutions and lessons learned helps build more resilient and adaptable systems."

Kerwin Liedeman, PhD Fellow at CERI and facilitator at the workshop, emphasised the importance of teaching both wet-lab and bioinformatics components together."Modern genomic surveillance relies on both high-quality laboratory methods and robust bioinformatic analysis," he said. "Teaching both components ensures that participants understand the complete workflow – from sample processing to data interpretation."

Participants were trained not only in running assays, but also in troubleshooting workflows and interpreting sequencing findings in real-world surveillance contexts. "Viral discovery is essential for outbreak preparedness because many emerging infectious diseases originate from previously undetected or poorly characterised viruses," said Liedeman. "By identifying and sequencing viruses early, we can better understand transmission patterns, monitor mutations, and assess potential public health risks before outbreaks escalate."

Facilitators from Columbia University's Global Alliance for Preventing Pandemics also highlighted the broader importance of expanding access to sequencing technologies globally.

Dr J. Kenneth Wickiser, Administrative Director of the Global Alliance for Preventing Pandemics (GAPP) at Columbia University's Mailman School of Public Health, said many current diagnostic workflows still leave large numbers of illnesses unexplained.

"When clinical researchers and public health professionals analyse samples collected from patients

and participants presenting with symptoms of interest, those testing positive for the suspected pathogen or small number of pathogens range from 20–50%," said Dr Wickiser. "The obvious question then is what is the causative agent for the other 50–80% testing negative?"

Dr Wickiser described VirCapSeq-VERT as a complementary tool capable of identifying unexpected pathogens, coinfections, and viruses for which no routine diagnostic tests yet exist. "The strength of VirCapSeq-VERT is to identify and characterise known pathogens that were unexpected, unknown pathogens to which there are no current RDTs or PCR assays, and coinfections in both clinical and environmental samples like wastewater," he explained.

Dr Wickiser also praised CERI's role in supporting long-term scientific capacity-building across the continent. "The CERI team is uniquely poised to have significant positive impact across the continent because they have an amazing facility, top-tier instrumentation, world-class experts in both wet lab and bioinformatics fields, and most importantly, they are trusted professionals dedicated to sharing and building capacity," he said.

Jack Collins, Staff Research Associate at GAPP, said the collaborative nature of the workshop was one of its strongest features. "I've been impressed by the range of research priorities, laboratory capacities, and challenges represented by the participants," he said. "It has been valuable to see them exchange ideas, compare approaches, and learn from one another's experiences across different settings."

Collins noted that workshops like this help create sustainable capacity by enabling participants to transfer skills back to their own institutions and networks. "That strategy is critical for expanding genomic surveillance and outbreak response capacity across Africa," he added.

For Dr Samuel Yingst, GAPP Africa Director, veterinary virologist, and diagnostics and One Health specialist, the workshop reflected a much larger shift taking place across African public health and scientific systems. Having worked in global health across Asia, Europe, and Africa for more than 25 years, Dr Yingst said strengthening independent disease detection capacity across the continent is critical for future health security and outbreak preparedness.

"My dream is to be a part of enabling all countries in Africa to independently detect emerging and re-emerging diseases, including Disease X, while maintaining full data sovereignty," said Dr Yingst.

He said technologies such as VirCapSeq-VERT and collaborative training models between Columbia University and CERI are essential for building sustainable surveillance systems. "I believe that public health and health economics are one and the same," he noted. "VirCapSeq-VERT is an essential tool for cost effectiveness, and the CERI focus on efficiency and resource sharing is key to access and health security.

Dr Yingst added that initiatives like the workshop are part of a broader transition taking place across African science and innovation systems. "We are in a period of transition in Africa from donor dependence to a bioeconomy," he said. "I believe this group will be a part of leading us there."

MSc STARS Reflections

Two African STARS fellows at CERI, pursuing an MSc in Bioinformatics of Infectious Diseases and Pathogen Genomics, share their experiences.

photos: **CERI Media, Charlie Sperring**

Nick Mogoi

Originally from Kenya, Nick previously completed a master's degree in Molecular Biology and worked in antimicrobial resistance research and pathogen genomics.

"When I joined the African STARS Fellowship, I knew the future of epidemic preparedness in Africa lay in the genomic data we generate, but I also recognised how much of that data remains underutilised. I wanted to help change that. The fellowship has given me the opportunity to move from generating data to interrogating it, developing skills in bioinformatics, genomics workflows, high-performance computing and machine learning. Every day, I am reminded that behind each dataset lies a public health question waiting to be answered. Working alongside outstanding scientists at CERI has strengthened my belief that Africa can lead in genomics research and epidemic intelligence. I am deeply grateful to the Mastercard Foundation and African STARS for investing in the next generation of African scientists."

Thato Phenyo

With experience spanning laboratory science and bioinformatics, Thato is passionate about using genomics to strengthen public health systems across Africa.

"A few months ago, coding meant little more than printing 'Hello World'. Today, I spend my days analysing genomic data, debugging scripts, and working with tools and concepts I had never encountered before joining the African STARS Fellowship. The journey has been challenging, requiring persistence, patience, and confidence when things do not work the first time. Yet every breakthrough brings a sense of achievement and reminds me how much I have grown. What makes this programme meaningful is understanding that the skills we are developing have the potential to improve lives through better disease surveillance, research, and public health decision-making. Beyond the technical training, the fellowship has connected me with inspiring mentors and peers from across Africa. I am grateful to the Mastercard Foundation and African STARS for investing in our future."

Genomics for Public Health

CERI's new Genomics of Antimicrobial Resistance (GEN-AMR) Research Unit will strengthen Africa's response to antimicrobial resistance through genomics, surveillance, and precision medicine.

text: **Dr Emilyn Costa Conceição**

The establishment of the GEN-AMR Research Unit at the Centre for Epidemic Response and Innovation (CERI) marks an exciting new step in strengthening pathogen genomics, surveillance, and precision medicine approaches for antimicrobial resistance (AMR) in Africa and beyond.

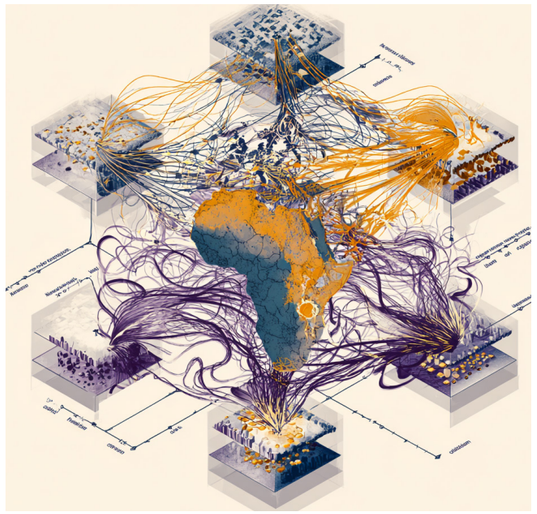
Based at the School of Data Science and Computational Thinking at Stellenbosch University, the unit was created to bring together genomics, bioinformatics, epidemiology, and implementation science to better understand the emergence, transmission, and evolution of drug-resistant pathogens of public health importance.

Through GEN-AMR, I aim to bridge cutting-edge genomic technologies with real-world public health and clinical applications, particularly in resource-limited settings. Our work will focus on advancing genomic surveillance systems, developing and implementing innovative sequencing and analytical pipelines, supporting precision medicine initiatives, and expanding regional capacity-building in genomics and bioinformatics. Initially, we will concentrate on high-burden infectious diseases and priority AMR-associated pathogens while fostering interdisciplinary collaborations across Africa and beyond.

My own scientific journey has spanned infectious diseases, microbiology, genomics, and molecular epidemiology. I obtained my MSc in Parasite Biology from the State University of Pará and completed my PhD in Microbiology through a collaboration between the Federal University of Rio de Janeiro and Paris-Sud University in France. Over the years, I have worked extensively in clinical trials, routine diagnostics, whole-genome sequencing, and genomic epidemiology, with a particular focus on bacteriology, tuberculosis, and mycobacterial diseases. This work has allowed me to contribute to the implementation of genomic surveillance networks, the development of bioinformatics workflows, and the integration of genomics into public health decision-making.

Before establishing GEN-AMR, I worked as a postdoctoral fellow within the Tuberculosis Genomics (TBG) group at Stellenbosch University as part of the Tuberculosis Omics (TORCH) consortium and later expanded my activities within CERI through the GenPath Africa Consortium. Throughout my career, I have coordinated international collaborations involving South Africa, Brazil, and European partners, contributing to projects focused on AMR, genomic surveillance, precision medicine, and capacity development. I also currently co-lead initiatives such as REVIGET and REVIGEN in Brazil, which aim to strengthen genomic surveillance and precision medicine networks for high-burden infectious diseases.

The GEN-AMR unit reflects CERI's broader commitment to innovation, equitable scientific partnerships, and translational research that generates impact beyond academia. By combining advanced genomic technologies with implementation-focused research and training, we hope to strengthen local and regional responses to AMR while contributing to global efforts in infectious disease preparedness and surveillance.



Media Coverage

Our work showcased in videos and featured on radio/TV.

Mapungubwe Honour

Prof Tulio de Oliveira has received South Africa's highest civilian honour, the Order of Mapungubwe in Gold, in recognition of his internationally significant contribution to the discovery of the COVID-19 Omicron variant and his leadership in advancing pathogen genomics through KRISP and CERI.

Watch the full video here:
https://www.youtube.com/watch?v=vQvQlcztK6s

Tracking Emerging Threats

In an interview with Al Jazeera, Prof Tulio de Oliveira explained the risks surrounding South Africa's rare hantavirus detection linked to a cruise ship, highlighting how genomic surveillance helps identify emerging infectious diseases while reassuring the public that the risk of wider spread remains low.

Watch the full video here:
https://www.youtube.com/watch?v=6EAuX3XUuJw

Pro-VC Open Lecture 1: Prof Thirumurthy

In the first lecture of the Pro-VC Open Lecture Series at Stellenbosch University, Prof Harsha Thirumurthy makes the case for moving beyond single-solution thinking in global health. Drawing on two decades of research across low- and middle-income countries, he explores how combining behavioural, biomedical, and structural approaches can lead to more effective and equitable health outcomes.

Watch the full video here:
https://www.youtube.com/watch?v=ZkK5Rb_y7h4

The Future of Genomics is Being Shaped in Africa

CERI at SU and KRISP at UKZN wishes to express its gratitude to the following funders for their generous support:
The Rockefeller Foundation, the Technology Innovation Agency (TIA) of the Department of Science, Technology, and Innovation (DTSI), the National Institute of Health, Gates Foundation South African Medical Research Council (SAMRC) , European Commission (EC) and the National Institute of Health, Abbott, EDCTP, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), German Research Foundation, UNIADS, National Research Foundation, the UK's Medical Research Foundation, Novo Nordisk Foundation, the Mastercard Foundation, and the Wellcome Trust.

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