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GLOBAL HEALTH MATTERS

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FOGARTY INTERNATIONAL CENTER • NATIONAL INSTITUTES OF HEALTH • DEPARTMENT OF HEALTH AND HUMAN SERVICES

Fogarty allocates $4M to support early-career scientists

Fogarty is providing $3.75 million over five years to support seven promising early-career scientists in low- and middle-income countries (LMICs). Issued through the Center's Emerging Global Leader Award program, the grants are intended to provide a period of protected time for research under the guidance of experienced mentors.

The new awards will support scientists in Jamaica, Kenya, Nigeria, Peru and South Africa. Research projects will explore topics ranging from the long-term effects of tuberculosis on children's lungs, the ways schools can support children with HIV, stroke prevention in children with sickle cell disease, efforts to address prostate cancer disparities in Black men and the use of text messaging in HIV care. Other projects will investigate molecular pathways and activation signals that determine susceptibility to HIV infection and whether males with asymptomatic sexually transmitted infections are more at risk of HIV infection, as well as the role of the ubiquitin- proteasome system in the development of severe malaria anemia.

Photo courtesy of University of the West Indies

Dr. Simone Badal of the University of the West Indies is one of seven early-career scientists to receive an Emerging Global Leader Award from Fogarty.

The program intends for recipients to launch independent global health research careers following this sustained period of training and research career development. Co-funding NIH partners for these awards include the National Cancer Institute and the National Institute of Neurological Disorders and Stroke.

NIH issues two awards for COVID research in Africa

A robotic lung ultrasound machine will be tested for COVID-19 triage in Nigeria and a cohort of South African children will be studied for serological response to coronavirus—both with emergency support awarded through revisions to existing NIH Common Fund grants.

Dr. Haichong (Kai) Zhang—a robotics engineering professor at Worcester Polytechnic Institute in Massachusetts—received funding to assess his prototype of a gantry-style lung ultrasound machine that can be operated remotely and easily. He is collaborating with a team in Nigeria to check the suitability of the new robot to standardize diagnoses of COVID-19 patients, lower costs and keep medical staff safer in a resource-limited setting. Zhang holds an NIH Director's Early Independence Award to study an imaging-based approach to identifying aggressive prostate cancer.

Meanwhile, Human Heredity and Health in Africa grantees Drs. Heather Zar and Mark Nicol received funding to investigate the spectrum of SARS-CoV-2 infection and COVID-19 symptoms in 900 well-characterized children in an existing cohort in South Africa. The children, 6-8 years old, will be followed to discern if previous infection with seasonal coronaviruses protects against infection with SARS-CoV-2 or the effects of COVID-19. In addition, the team will integrate serological data with other information such as diet to identify factors contributing to the mildness of COVID-19 symptoms in most infected adolescents.

FOCUS

NIH hosts virtual conference on data science in Africa

- Encouraging public-private partnerships to increase impact
- Harnessing innovation and entrepreneurship for health advances
- Training the next generation of data science leaders

Read More on pages 91-94

NIH invests $14M for NCD research and training

Cancer, diabetes, mental illness and other noncommunicable diseases (NCDs) are on the rise and now claim more lives in low- and middle-income countries (LMICs) than infectious diseases. To help address this, Fogarty and its funding partners have awarded about $13.9 million in 17 new grants to support NCD research and training in LMICs.

Eight awards will fund exploratory research on a variety of NCD topics. For example, a checklist designed to improve trauma care will be implemented and assessed for effectiveness at a number of hospitals in Ghana by scientists at the Kwame Nkrumah University (KNU). A second KNU award will fund the first genetic studies of a craniofacial birth defect in a sub-Saharan African population. In Mali, researchers at the University of Sciences, Techniques and Technologies of Bamako will adapt an existing diabetes prevention program targeting individuals and couples and evaluate its impact. If successful, the educational materials produced in French could be scaled up throughout Francophone West Africa. Meanwhile, Makerere University scientists will develop and test a social network-driven advocacy intervention to promote cervical cancer screening in Uganda.

Photo by David Rockkind for Fogarty

Diabetes, multi-morbidity care management and mental health issues are some of the topics being addressed through new Fogarty noncommunicable disease research and training grants.

In Mexico, the National Institute of Public Health will study exposure to aflatoxin, a fungal contaminant in food, and its impact on the country's increasing rates of hepatocellular cancer. Peru's Universidad Cayetano Heredia will investigate barriers to multimorbidity care management through patient interviews and other methods.

Researchers at two hospitals in Nepal will build capacity to implement and evaluate a package of essential NCD interventions recommended by the WHO, as well as explore facilitators and barriers to its implementation. Finally, the American University in Beirut (AUB) will form a multidisciplinary collaboration to examine and address the social, cultural and biological determinants of diabetes and cardiovascular disease in Lebanon and throughout the Middle East and North African region.

In addition, nine grants will support research training projects. For instance, the Icahn School of Medicine at Mount Sinai will develop and conduct a multi-level capacity building program in environmental and occupational health for Costa Rican scientists. The University of California, San Francisco will use its award to produce an interdisciplinary cancer research training program in Tanzania to build a cadre of scientists throughout East Africa capable of advancing discoveries and informing cancer control planning in the region.

Meanwhile, the University of North Carolina at Chapel Hill aims to address the mental health treatment gap in Mali through a research training model designed to create a team of trained researchers, engage key stakeholders and establish links between research, policy and practice to maximize impact. In Uganda, the Mbarara University of Science and Technology will increase junior faculty expertise in multi-morbidity through a holistic understanding of health and a focus on social-behavioral and environmental determinants, while a grant to Makerere University will strengthen research training and mentorship to improve brain health. The University of Washington will collaborate with partners in Nepal and Kenya to address cardiometabolic diseases and risk factors through educational programs, strong mentorship and relevant research experiences.

Rutgers University will expand its existing botanicals-focused research training program in Tajikistan and begin offering training to Indonesian scientists as well. Local plants are studied for the prevention and treatment of inflammation-associated conditions, such as diabetes, arthritis and neurological disorders. The New York State Psychiatric Institute will leverage the mental health research training program it developed in Portuguese for Brazilian trainees to build capacity in Mozambique, where there are 29 million people and only 18 psychiatrists. AUB will strengthen its existing NCD research training program by developing advanced research methods modules, cultivating grassroots mentorship and offering fellowships to enhance research productivity.

Fogarty issued the NCD awards with co-funding provided by the Office of Dietary Supplements, Office of Research on Women's Health, National Center for Complementary and Integrative Health, and National Institute of Mental Health.

RESOURCES

http://bit.ly/NCDgrants

African experts share COVID contact tracing tips

By Susan Scutti

African nations have recorded lower rates of COVID-19 than many high-income countries, which is attributable, some say, to the continent's robust public health response. Several leaders of coronavirus response teams in Africa presented best practices of contact tracing in a recent webinar organized by AFREhealth's Dr. Jean Nachega and Fogarty's Deputy Director Dr. Peter Kilmarx. Presenters from Nigeria, South Africa, Uganda and Rwanda said their countries responded to the pandemic with largely similar measures, and transitioned from centralized contact tracing efforts to decentralized models over time.

Nigeria leveraged community networks established in response to Lassa fever and Ebola, said Dr. Rhoda Atteh, leader of her nation's COVID operation center. Contact tracers primarily relied on in-person interviews—not phone calls—to connect the dots between Nigeria's confirmed and suspected cases. "We focus on doing self-isolation at home and also monitoring contacts remotely," she said, acknowledging that it's been difficult to assess adherence. "There's a lot of misinformation and stigma around COVID-19," said Atteh, who heard reports of contact tracing teams being attacked. "For a lot of cases identified, not a single contact is actually traced," said Atteh. More community engagement, both before and during the contact tracing process, would improve Nigeria's response, she suggested.

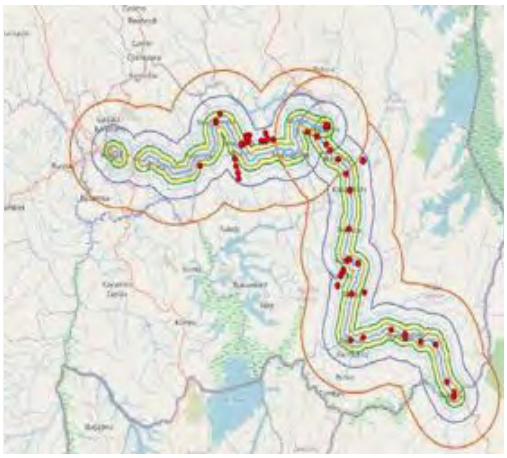


Image courtesy of Dr. Sabin Nsanzimana

Rwanda's COVID-19 response included using a GPS app to monitor and conduct contact tracing of truck drivers.

When the virus began to circulate in Uganda, the government activated an incident management system, according to Dr. Alex R. Ario, of the country's National Institute of Public Health. Non-pharmacological interventions combined with regional contact tracing helped interrupt the country's outbreak. Regional teams linked with the incident management operation to maintain communication with laboratories and case management workers, explained Ario, noting that "established community systems" required less expense and were more efficient than a centralized approach.

In Rwanda, pandemic-related public health measures included handwashing stations, face-masking and physical distancing. A national preparedness and response command post managed epidemiology surveillance, case management, laboratory operations, data science, logistics, communications and administration, said Dr. Sabin Nsanzimana, director of Rwanda's Biomedical Centre. An advisory group of Rwandan scientists also provided data and evidence-based recommendations. Nearly 20,000 contacts have been traced and checked, he said, noting some contacts were not accessible but "they're not many." To decentralize contact tracing efforts, Rwanda adapted "a complexity of IT solutions," he added. This includes a geospatial mapping system, an IT notification system previously used in the HIV program, an electronic tool for conducting home-based monitoring and a GPS app for truck drivers. Stigma was a problem initially, yet as people came to better understand the disease, "this is no longer an issue," said Nsanzimana.

In South Africa, the government declared a national disaster followed by travel restrictions, distancing measures and a coronavirus testing program. Drs. Hassan Mahomed and Masudah Paleker coordinated contact tracing in Western Cape Province. Paleker, who believes geography itself posed a challenge to contact tracing in a province with rural and urban areas, said "we started a decentralized process from quite early on."

Preexisting district teams drove the effort aided by the provincial health department. A single patient viewer (SPV) electronic database was repurposed to conduct contact tracing and case reporting due to its accessibility and sorting capabilities. The health department developed two additional applications for monitoring symptoms and uploading contact details.

"Both of these applications had fairly limited uptake by the population, although they were quite actively promoted," said Mahomed. Isolation facilities were also underused, "partly because of stigma, partly because of fear of loss of a position or what would happen to their homes," he said, while anecdotal reports suggest low adherence to quarantine measures. Still, Mahomed said he believes the SPV database was crucial to the outbreak response, while best practices include community preparation and planning, and population-based infection control practices. He added that South Africa is preparing for future waves of the disease. "Our current strategies are to be agile and scalable in order to respond quickly."

RESOURCES

http://bit.ly/africa-contact-tracing

PROFILE

Fogarty Scholar characterized a diabetes syndemic in India

By Susan Scutti

Indian attitudes about type 2 diabetes took Dr. Emily Mendenhall by surprise. "People were kind of dismissive in Delhi, saying, 'Everybody has a little diabetes,'" observed the former Fogarty Scholar. "This was very different than in the U.S., where there's a lot of moral blame and people say, 'You didn't eat right, you didn't exercise—it's all your fault that you have diabetes.'" Research in India led to greater insight, which is exactly what she hoped to gain from her Fogarty fellowship, said Mendenhall.

Emily Mendenhall, Ph.D.

Fogarty Scholar:	2011-2012
US Institution:	Northwestern University
Foreign Institutions:	Public Health Foundation of India
Research area:	Type 2 diabetes among different income groups

Mendenhall had begun studying diabetes among Mexican immigrants while at Northwestern University, which inspired her to think about the disease "as an interconnected condition that reflected social change." Re-envisioning a common American disease paved the way for research in a lower resource country. The scientists behind the Center for Cardiometabolic Risk Reduction in South Asia (CARRS) Surveillance Study—a community-based survey in India and Pakistan—learned of Mendenhall's diabetes work and promised her freedom to design her own research if she joined them in Delhi on her yearlong Fogarty fellowship. Historically in India, type 2 diabetes was considered an illness of the elite, but CARRS data indicated a socioeconomic reversal as diabetes rates began to rise among less fortunate Delhi residents.

As a Fogarty Scholar, Mendenhall was able to develop her research skills, such as designing instruments, training researchers and analyzing data. Paired with Dr. Roopa Shivashankar of the CARRS study, Mendenhall developed two new research tools for ethnographic research—one a qualitative interview covering five domains, the other a narrative interview focused on stress. Unable to speak Hindi, Mendenhall trained two research assistants to conduct interviews of 60 Delhi residents divided into age-and-sex-matched groups representing low-income, middle-income and high-income categories.

Everyone in Delhi, no matter their social status, reported feeling stressed within the rapidly transforming society, the interviews revealed. "People were dealing with important cultural experiences that elicited strong emotional responses," Mendenhall explained. Both middle- and upper-income folks felt tension due to evolving expectations—Is conspicuous consumption necessary to maintain respect in this brave new society? If so, what must I buy? Yet, lower-income people struggled with "intense familial kinds of expectations" due to the need for amassing dowries and sending children to schools, she said. Diabetes was "experienced and perceived and embodied differently" by low-income patients compared to those with higher incomes, Mendenhall's analysis indicated. The findings also showed an inequitable distribution of depression, with 55% of the lowest income participants reporting symptoms compared to 38% and 29% middle- and high-income participants, respectively. People with diabetes and low incomes were more likely to delay seeking care, have lower rates of treatment and higher levels of stress.

Overall, the Mendenhall team's research, published in *Social Science and Medicine*, suggested synergies among diabetes, depression and social inequality in urban India. Since her Fogarty fellowship, Mendenhall has begun using the term "syndemics" to describe similar co-existing epidemics she has studied in South Africa, Kenya and Ethiopia. Recently, Fogarty awarded the Georgetown University associate professor a global noncommunicable diseases research grant to examine the application of syndemics theory within a framework of implementation science.

"Because I am an anthropologist, and not a doctor or epidemiologist, I am an example of Fogarty taking a risk," said Mendenhall. "Syndemics is a way to bring us all together to have a conversation about how interactions matter so fundamentally to what health and illness mean."

RESOURCES

Profile: http://bit.ly/DiabetesSyndemic

Q&A

BRUCE TROMBERG, PHD

Dr. Bruce Tromberg is the director of the NIH's National Institute of Biomedical Imaging and Bioengineering (NIBIB), where he oversees a $400 million per year portfolio of research programs focused on developing engineering, physical science and computational technologies for their application in biology and medicine. In addition, he leads NIBIB's $500 million Rapid Acceleration of Diagnostics Tech (RADx Tech) innovation initiative to increase SARS-CoV-2 testing capacity and performance. Together with Fogarty, NIBIB is a partner on the Harnessing Data Science for Health Discovery and Innovation in Africa (DS-I Africa) project, led by the NIH Common Fund.

What is NIBIB's role at NIH?

Our formal mission is leading the development and accelerating the application of biomedical technologies. A large part of that is data science, which includes modeling, computation and machine intelligence. We use these approaches to simulate or emulate biologic systems or devices and their interactions, and to extract information—with images and sensors—so we can gain further insight into those systems. We are working to advance engineered biology, which involves treating cellular systems, multicellular systems, tissues and entire organs as engineerable devices that can potentially be reprogrammed to prevent, slow, or reverse disease. We develop sensors and point-of-care devices. These can be wearable sensors that are based on a variety of different mechanisms including photonic, acoustic or electrical types of sensing for transducing biologic processes into signals that can be measured and quantified. These technologies are rapidly moving into implantable devices where the sensors have been engineered to be very specific for chemistries that are critical for monitoring and predicting disease.

We're also very engaged in supporting imaging technologies, which can span from devices that are small enough to be at the bedside, to very large physics imaging devices. With increasing attention to innovation, computation, new materials and costs, we can reduce the size and the complexity of these devices, and still be able to extract very complex and rich information. Finally, we are working to develop new therapeutic devices, many of which are completely noninvasive.

What is the potential of DS-I Africa?

What's driving a lot of our progress is the fact that we have access to technologies that are entirely new and much of this is coming from the consumer device industry. In fact, there's a very thin line separating what we think of as consumer devices from medical devices, and we're seeing a convergence in these technologies. Many of the consumer devices are helping us prevent disease and are used in home care settings. It's clear much of the innovation and entrepreneurial community is interested in leveraging this kind of technology, which necessarily will involve a lot of data generation, hence, the great partnership between innovative engineering and data science.

What excites you about DS-I Africa?

For a number of years, I've been helping develop African bioengineering expertise through a spectral imaging network led by Professor Jérémie Zoueu at the National Polytechnic Institute in Cote d'Ivoire. It's evolved into a training and education course that examines new technologies, develops an understanding of how they work and encourages their repurposing for new applications to meet the emerging needs of the population. We believe this is foundational for the future of health and that building technology innovation networks is the way to get there. That's what we're hoping to do through our DS-I Africa program as well. This will help African scientists understand, prevent and detect disease, and advance their ability to personalize diagnosis and treatment. Ultimately, this will extend the population's health span, reduce costs and barriers to access, and continue to drive innovation.

How else is NIBIB engaged in global health?

One of the recent major programs that we've developed and launched in collaboration with the Bill and Melinda Gates Foundation is the NIH Technology Accelerator Challenge (NTAC). The challenge is a million-dollar competition for developing noninvasive devices to leverage those types of consumer technologies to diagnose, track and assess response to therapy for diseases of the vasculature, with a focus on malaria, sickle cell and anemia. We recently announced the prize winners who came up with some quite stunning projects. Our goal is to drive innovation and commercialization and to encourage widespread dissemination of these technologies.

Note: this article is based on Dr. Tromberg's August 12th DS-I Africa presentation.

NIH meeting examines data science potential for Africa

Data science holds enormous potential to spur health discoveries and catalyze innovation in Africa and is the topic of a new $58 million NIH funding initiative. A virtual symposium and networking platform was launched to foster collaborations across disciplines, sectors and geographies in the hopes of cultivating quality applications for the program. It contains videos of keynote addresses and panel discussions, technical grant application advice, chat rooms, networking bulletin boards and other features.

The Harnessing Data Science for Health Discovery and Innovation in Africa (DS-I Africa) program is intended to encourage interdisciplinary partnerships that bring together data specialists, computer scientists and engineers with biomedical researchers, clinicians and other health experts. The program aims to create a culture of innovation and entrepreneurship that will result in new software solutions and technologies, produce start-ups and spinoff companies and partner with governments and businesses to reach scale and impact.

More than 1,700 registrants participated in the virtual DS-I Africa forum, with more than half coming from Africa. In his keynote address, NIH Director Dr. Francis Collins said the continent is witnessing an incredible time of growth and change. "Africa is very well situated to play an increasingly significant role in this area of scientific opportunity," he said. "We want to see partnerships that go beyond the traditional academic research arena, partnerships that connect up with government, with the private sector and with NGO partners. We want to be sure that this is focused in a way that solves health challenges in Africa in a sustainable way."

Collins noted that the NIH has been helping to develop research capacity throughout Aftica in preparation for the coming decade, when rapid advances are expected to transform biomedical and behavioral research and lead to improved health care.

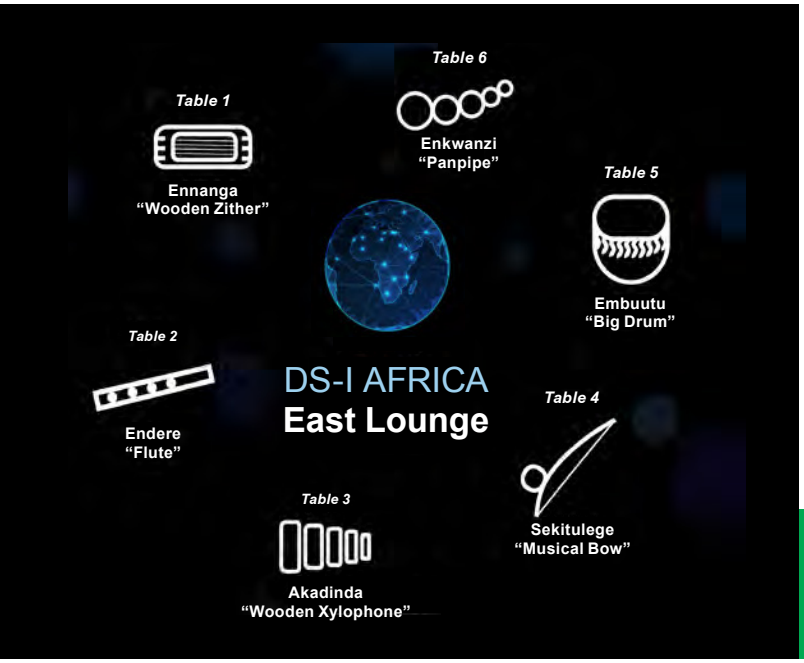
This African-led data science initiative is intended to build on previous large-scale NIH collaborations on the continent, including the Human Heredity and Health in Africa (H3Africa) program, the Medical Education Partnership Initiative (MEPI) and the Health-Professional Education Partnership Initiative (HEPI). H3Africa advanced genomics capacity and research partnerships, while MEPI and HEPI strengthened and expanded training for doctors and health care professionals.

DS-I Africa is an NIH Common Fund program guided by a working group led by the Office of the Director, Fogarty, the National Institute of Biomedical Imaging and Bioengineering, the National Institute of Mental Health and the National Library of Medicine.

Applications for DSI-Africa opportunities are due in late 2020 with projects slated to begin in September 2021. The four unique categories of funding are:

- **Research Hubs:** Advance and demonstrate feasibility of data science research and innovation to improve health in Africa.
- **Training:** Increase capacity for data science research in Africa.
- **ELSI Research:** Explore ethical, legal and social implications of data science research from an African perspective and contribute to policy discussion on the continent.
- **Open Data Science Platform & Coordination Center:** Facilitate the development of a trans-African network of data scientists.

NIH had originally planned to hold the Data Science in Africa conference in Kampala. The virtual networking platform paid tribute to traditional Ugandan musical instruments.



Articles in this section are by Susan Scutti
Resources: http://bit.ly/data-science-africa

Data science applicants urged to find diverse partners

Multidisciplinary collaborations will be key to the success of NIH's new DS-I Africa program. Applicants are encouraged to form partnerships that reach beyond academia to include governments, the private sector, NGOs and other stakeholders. An additional requirement is to bridge disciplinary divides, where health scientists collaborate with engineers, computer scientists, data experts and others. The goal is to build a sustainable and robust ecosystem for health discovery in Africa.

Multidimensional connections serve pragmatic purposes, according to the partnership panel at the recent virtual DS-I Africa conference. Teams of diverse colleagues raise and address a wider range of issues than siloed collaborations and this greater scope offers a higher probability of success, according to Dr. Beatrice Murage, who develops partnerships in Africa and Asia for Philips. She said she is hoping to work with academic researchers who are customer-focused, able to develop products tailored to "pain points"—what customers ask for and need—and who take the long view. "We want to build solutions that last beyond, let's say, one pilot or one study or one thesis, solutions that we can scale over time and over market and that have actual business value."

Partnerships with study participants are also of great importance, emphasized Dr. Julie Makani of Tanzania's Muhimbili University of Health and Allied Sciences. She said she looks forward to the development of "well-coordinated prospective and longitudinal cohorts in Africa" so that data scientists might better understand the physiological response to illness and so "identify novel, therapeutic interventions to reduce the burdens of disease." Makani mentioned a cohort of 5,000 sickle cell disease patients that have been followed over 15 years. The enormous amount of data generated by this research raised questions far beyond the project itself: How can these data be used to inform policy? How can these data improve both basic science and clinical science research? "Data science is one of the ways that we can ensure that we integrate health, education, advocacy and research so that we improve health," said Makani.

To bring about real change, partnerships with governments and other policymakers are necessary, said Brian Gitta, a tech entrepreneur based in Uganda. "We need to build awareness of the importance of data for medicines, for disease tracking and community health monitoring such that we work with a variety of stakeholders, taking ownership of this data in the process," he said. Gitta said harnessing health data will require more than innovative technologies—it will also take creative management and bold action from governments to ensure that Africans have the resources, tools and skills to lead this transformation.

Philips, which developed this portable ultrasound device, is one of many private companies hoping to partner with academic researchers on data science activities.

Photo courtesy of Philips

That opinion is shared by Sierra Leone's chief innovation officer, Dr. David Moinina Sengeh. "We want to be in a place to ensure that the economy, the identity and governance becomes digital," said Sengeh. To achieve this goal of "digitization for all," Sierra Leone administrators rely on three principles when choosing partners. First, potential collaborators need to prioritize mobile solutions, the lifeblood of his nation's computing power. Second, they must believe the goal of evidence-based policies is achieved through the use of artificial intelligence and other tools. Third, partners must design hybrid technology systems, Sengeh said. "Everything we do has to work online and offline, has to work on web, mobile and paper, and it has to work when there's power and when there's no power,"

Alignment in views and methodology was a key concern for all panelists but they agreed soft skills also matter. "You want that excitement, that energy on the ideas that you all are putting forth, and you want folks that you can talk with about difficult things," observed Dr. Aisha Walcott-Bryant of IBM Research Africa. Simply wanting to be a team member goes a long way as well, she added.

Humility is the most important feature of any collaboration, Makani suggested. Each partner must understand the value of all the partners involved, from governments to patient communities. "Data science is a fantastic platform that will bring disparate people and disparate communities together. No one body or institutional sector can do this alone," said Makani. "We really need to work together."

Harnessing innovation to advance research discoveries

At the heart of the DS-I Africa project are research hubs that are intended to become recognized centers of excellence in data science fields, and advance affordable and scalable solutions to improve health. One conference session was devoted to a discussion of how innovation can be sparked and channeled to achieve maximum impact.

The best way to understand innovation is to think of it as the antithesis of research, according to Dr. Robert Karanja, co-founder of Villgro Kenya, an investment company. If the goal of the scientific process is a product, then it is the "process called innovation" that is able to take new knowledge discovered through research and "create money at the end of the tunnel," he said. "Intellectual property in itself is not an end tool." Africa has a huge advantage compared to other nations because it can exploit the "fourth industrial revolution" in faster and cheaper ways than high-income countries that are already invested in older technologies, Karanja added.

Photo courtesy of MamaOpe

Recent African tech innovations include this tool for diagnosing pneumonia in children. It was a project of the business incubator Villgro Kenya, founded by Dr. Robert Karanja, who spoke at the DS-I Africa conference.

Teaching approaches also must be modernized, said Dr. Gregory Gamula of Malawi Polytechnic. Until recently, engineering education was much too old-fashioned. An "all-knowing teacher" would stand before "students who are ignorant and deliver everything that he has acquired and the students are just listening," he said. Today, engineering education relies on more interactive ways of transferring knowledge to students. This newer style of education suits Malawi's growing need for low-cost, robust and effective technologies, said Gamula, who explained that foreign health care equipment often does not work in his nation's high temperatures and humidity. Malawi needs devices designed by home-grown engineers. The change in education has already made a difference, with Malawian-developed products such as a tool to treat infant jaundice, low-cost ventilators and portable solar sample coolers having been rolled out in the country's hospitals.

Yet the issue of brain drain remains a painful topic. "Africa has very many young brains, young people, but when they grow up, they are looking towards the U.S.A., looking towards Europe," noted Uganda's science minister, Dr. Elioda Tumwesigye. Given access to resources, he believes young scientists would remain in Africa, where they can help "our continent to develop our own capacity, to produce products that are needed and bring solutions to the challenges that we face as in Africa."

Unique methods needed to train data scientists

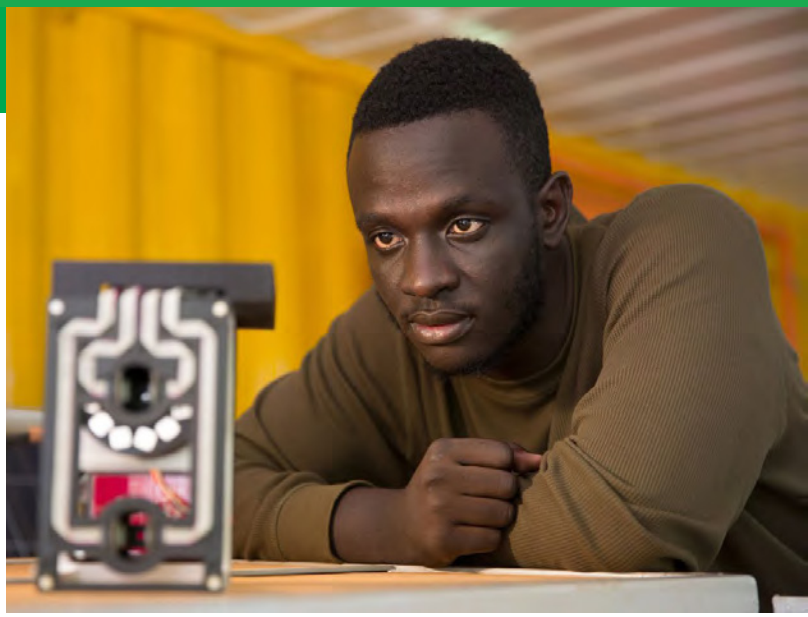
When capacity building came under the microscope at the DS-I Africa conference, discussants agreed more educational opportunities are needed. While demand for data science degrees is great, the supply of qualified teachers is lacking, according to the University of Rwanda's Dr. Ignace Kabano. The discipline is "a blend of mathematics, statistics and computer science, yet most lecturers have expertise in just one of these fields," he noted. Rare is the expert equipped with skills related to data manipulation and data capture who also has the statistical chops to analyze big data. Kabano also suggested Africa's data science programs should seek accreditation by the Data Science Council of America to achieve global parity.

A well-rounded data science education includes theoretical training for the development of research skills and "real world" problem-solving, said Dr. Mahadia Tunga, of the Tanzania Data Lab. In 2018, Tunga's team partnered with the University of Dar es Salaam to design a master's program in data science. For their capstone projects, students work directly with NGOs to identify and solve data challenges. Data science training also needs to address and promote inclusion, Tunga proposed. Since fewer than 30% of her participants are female, she is targeting women early in their careers for skill development and matching them with appropriate mentors to encourage them to stay in the field.

Conducting ethical data science research in Africa

Privacy, research subject consent and other issues pose major concerns for data science studies. The DS-I Africa project includes a component specifically to ensure the ethical, legal and social implications (ELSI) of data science research are an integral part of the initiative. In a panel discussion on the topic, the unique challenges were considered. “Whereas in most research projects, we are concerned about individual level interaction and data, data science often engages with big data, huge amounts of structured and non-structured data, that may have been captured with the active or non-active participation of the human subject,” explained the University of Maryland’s Dr. Clement Adebamowo. Because of this, the risks, benefits and burdens of data science may be distributed unevenly and inequitably across society.

Data science poses inherent difficulties vis-à-vis participants and privacy, according to Pamela Andanda of the University of Witwatersrand. “Data is always related to some human person. We need to consider the role of ethics in ensuring that individuals are respected,” she said. “We get their consent, but consent is not a once-off encounter. It’s an ongoing process.” Ananda’s ultimate strategy for integrating an ELSI framework into data science requires reflection on four values—honesty, care, respect and fairness. She believes a data scientist needs to take a few steps back at each stage of research and ask: "Am I being honest? Am I caring for people that are behind the data that I’m handling? Am I respectful? Am I fair in my dealings with other stakeholders?”



Bold action from African governments will be required to fully harness the potential of health data, according to Ugandan tech entrepreneur Brian Gitta, a speaker at the Data Science in Africa conference.

Photo courtesy of Royal Academy of Engineering

Researchers have the obligation to describe potential risks and benefits for the entire community—not just study participants, said Dr. Josephine Agyeman-Duah of Oxford University. She said it is necessary “to empower the community, empower people, to understand the research, what we’re trying to do, how it will be of benefit to them and the implications—and also sensitize them so that they know when to speak out when people breach their rights.” Because data can be transferred and manipulated beyond the original study consented by participants, research subjects should have the right to withdraw at any point. She added that “withdrawing from research should not affect the rights that they have to medical care that they receive.”

Leveraging data systems to foster research networks

Africa’s data science ecosystem was examined during the DS-I Africa conference to consider the open data science platform component of the program. The successful applicant will develop and maintain a data-sharing gateway and provide the organizational framework for the direction and management of the initiative’s common activities. Cloud computing, data security and interoperability were some of the issues considered.

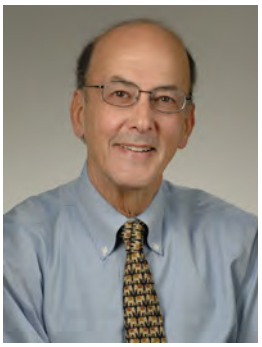
“We've been making amazing progress in generating increasingly vast datasets that offer tremendous research capabilities,” said Dr. Benedict Paten, of the University of California, Santa Cruz. Yet, massive amounts of information mean “it's no longer possible to take the data and bring it to you, bring it to your laptop or bring it to your institution,” he said. Continuing the familiar, outmoded ways of handling data not only leads to great expense, it causes security problems and sharing difficulties. Data scientists need to “invert the model” by creating data biospheres that are modular, community-focused, open and standards-based, said Paten.

Crowdsourcing is another promising aspect of data science, said Notre Dame University’s Dr. Geoffrey Siwo. He helped organize the Malaria DREAM Challenge, a project to identify problems in malaria that could be solved using genomic data, which involved 360 participants from 31 countries working together. The primary lesson learned, he said, was “you get a huge diversity of solutions that you as an individual or your lab or your company could not have imagined” when you open a data science problem to “basically anyone in the world.”

OPINION

By Dr. Roger I. Glass, Director, Fogarty International Center

Now is the time to catalyze data science and health innovation in Africa



Data driven science, discovery, and care are the health currencies of the future. They have enormous potential to revolutionize science, speed health discoveries and strengthen the health care system in Africa. To ensure African scientists are prepared to lead the coming surge of big data research, NIH is investing $58 million over five years in the Harnessing Data Science for Health Discovery and Innovation in Africa (DS-I Africa) program. It will leverage data and technologies to help African scientists develop knowledge and craft solutions for the continent's most pressing clinical and public health problems. The first awards will be made in 2021.

The continent stands at an inflection point. Expansion of R&D, manufacturing, and connectivity have positioned Africa for explosive growth in health innovation. Its population is rapidly expanding, with the number of people under the age of 25 predicted to almost double by 2050, rising from 230 million to 450 million. High-speed internet connectivity is improving and sub-Saharan Africa is expected to have over 600 million unique mobile phone subscribers by 2025.

Some African leaders are eager to embrace innovation and transition to knowledge-based economies, recognizing the opportunity to "leapfrog" the adoption of health innovations and implement new approaches unburdened by legacy systems. With novel technologies designed to improve health promotion, diagnosis and disease treatment, these leaders believe they can improve efficiency, cost effectiveness and quality of care while leveraging automation to mitigate health workforce shortages.

With DS-I Africa, NIH will be building an innovation and data science consortium that seeks to disrupt the status quo and spur new mechanisms to utilize data in ways that can transform how countries work. We envision a robust, African-led network of public and private partners that fosters a culture of innovation and entrepreneurship, accelerating scientific discoveries, devising new software solutions and technologies, generating start-ups and spinoff companies, and collaborating with governments and businesses to reach scale and improve health.

We aim to attract collaborators from multiple sectors, uniting data specialists, computer scientists and engineers with biomedical researchers, clinicians and other health experts in interdisciplinary teams. We invite African governments, industry and other research funders to join our efforts to synergistically increase their reach and impact.

We plan to fund an open data science platform and coordinating center, support the development of robust research hubs, train a cadre of skilled data scientists, and advance understanding of the ethical, legal and social implications (ELSI) of data science approaches in an African context. Discoveries made possible by data science advances in Africa have the potential to benefit the entire world, since we are all from Africa—the cradle of humanity—and share a common inheritance.

NIH has much relevant expertise to contribute to DS-I Africa, which leverages the substantial investments NIH has already made across the continent. DS-I Africa is a program of the NIH Common Fund that supports innovative endeavors with the potential for extraordinary impact. DS-I Africa is guided by a working group led by Common Fund staff in the Office of the Director, Fogarty, the National Institute of Mental Health, the National Institute of Biomedical Imaging and Bioengineering, and the National Library of Medicine.

To encourage networking across disciplines, sectors and geographies and to foster collaborations for DS-I Africa applications, NIH is hosting a virtual symposium platform with videos of keynote presentations, panel discussions, technical grant advice and networking tools.

We hope others who share our vision for advancing data science to transform health in Africa will join our effort to empower and bolster African partnerships. It is only right that all the world's people—especially those who have the fewest resources and the greatest

RESOURCES

http://bit.ly/DataScienceAfrica

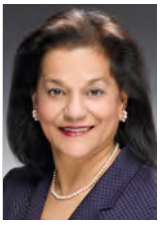
PEOPLE

New NIH eye institute director has global ties

Dr. Michael F. Chiang is the new director of NIH's National Eye Institute. An ophthalmologist, Chiang most recently was professor at Oregon Health & Science University and associate director of OHSU's Casey Eye Institute. He has research ties to Asia, Europe, the Middle East and South America.

NIH taps Criswell to lead arthritis, skin disease research

NIH has selected Dr. Lindsey A. Criswell as the new director of the National Institute of Arthritis and Musculoskeletal and Skin Diseases. Criswell was vice chancellor of research at the University of California, San Francisco. She has been principal investigator on multiple NIH grants and published more than 200 peer-reviewed papers.



D'Souza is the new director of NIH dental research

Dr. Rena D'Souza is the new director of the National Institute of Dental and Craniofacial Research. A past president of the International Association for Dental Research, D'Souza is vice president of health sciences at the University of Utah. Born in India, she has lived in the U.S. since 1978.

Fauci to receive RF Kennedy Ripple of Hope Award

Dr. Anthony Fauci will receive the Robert F. Kennedy Ripple of Hope Award during a virtual ceremony in December. The honor celebrates outstanding leaders who have demonstrated a commitment to social change. Fauci is recognized for his work as director of the National Institute of Allergy and Infectious Diseases.

Fogarty mHealth grantee wins NIH tech competition

Fogarty grantee Dr. Young Kim has won the $400,000 first prize in the NIH Technology Accelerator Challenge. The Purdue University engineering professor's proposal aims to develop a non-invasive, smartphone-based spectroscopy platform to detect anemia and sickle cell disease by analyzing photos of the microvasculature of the inner eyelid.

Meshnick remembered for dedication to global health

Fogarty grantee Dr. Steven Meshnick died of cancer in August. He was a professor of epidemiology at the University of North Carolina (UNC) and a member of the UNC Institute for Global Health and Infectious Diseases. Meshnick is being remembered for his work on malaria and other tropical diseases.

Former Fogarty bioethics trainee is honored

University of Ghana bioethicist Dr. Paulina Tindana has received the inaugural Forum on Bioethics in Research award for her paper, which explores the issue of informed consent regarding genomic research and establishment of biobanks in sub-Saharan Africa. Tindana is a former Fogarty bioethics trainee.

Global HEALTH Briefs

G-FINDER urges increased R&D investment

Funding for emerging infectious disease basic research and product development reached $886 million in 2018, up 14%, according to the new G-FINDER report issued by Policy Cures Research, a global health think tank. However, the report's lead author says spending is "very reactive" and urged for more consistent investments to prepare for the next pandemic.
Full report: http://bit.ly/Gfinder2020

WHO: sepsis causes 20% of global deaths

Sepsis–the body's potentially deadly response to infection–is responsible for 1 in 5 deaths worldwide, the WHO warns in a new report. While most sepsis research is conducted in high-income countries, the majority of cases occur in low-resource settings. Nearly half of the 49 million cases each year occur among children, causing 2.9 million deaths.
Full report: http://bit.ly/WHOsepsis

NCD agenda should be reframed

The global approach to noncommunicable diseases and injuries needs an "urgent upgrade" to meet the needs of the world's poorest people, according to a recent Lancet Commission report. Potential solutions have placed an outsized focus on changing behavior, the authors maintain, instead of examining root causes of NCDs.
Full report: http://bit.ly/LancetNCD

Report examines AI's role in global health

A roadmap for applying artificial intelligence to global health problems was recently released by the Broadband Commission for Sustainable Development's Digital Health Working Group. The report identifies high-leverage opportunities for AI to support global health projects for low- and middle-income settings and emphasizes the need to systematically integrate AI into healthcare infrastructures.
Full report: http://bit.ly/AIglobal

Child lead poisoning is global problem

A third of the world's children have been poisoned by lead, according to a new analysis by UNICEF and Pure Earth. The report says that around 1 in 3 children–up to 800 million globally–have blood lead levels higher than is deemed safe. Informal and substandard recycling of lead-acid batteries is a leading contributor.
Full report: http://bit.ly/UNICEFlead

Funding Opportunity Announcement	Deadline	Details
Global Infectious Disease (GID) Research Training Program	Oct 28, 2020	http://bit.ly/IDtraining
Emerging Global Leader Award	Nov 4, 2020	http://bit.ly/NIHGlobalLeader
Global Brain and Nervous System Disorders Research Across the Lifespan	Nov 6, 2020	http://bit.ly/NIHGlobalBrain
Reducing Stigma to Improve HIV/AIDS Prevention, Treatment and Care in LMICs	Nov 12, 2020	http://bit.ly/NIHstigmahiv
Chronic, Noncommunicable Diseases and Disorders Research Training	Nov 13, 2020	http://bit.ly/NCDtrain
Ecology and Evolution of Infectious Diseases	Nov 18, 2020	http://bit.ly/EEIDNIH
Harnessing Data Science for Health Discovery and Innovation in Africa U2R Research Training Program U01 Ethical, Legal, and Social Implications Research U2C Open Data Science Platform and Coordinating Center U54 Research Hubs – non-AIDS applications U54 Research Hubs – AIDS applications	 Nov 24, 2020 Dec 1, 2020 Dec 3, 2020 Dec 8, 2020 Feb 8, 2021	https://bit.ly/nih-dsiafrica-funding
Mobile Health: Technology and Outcomes in LMICs - AIDS applications	Dec 3, 2020	http://bit.ly/NIHmhealth
HIV-associated Noncommunicable Diseases Research at LMIC Institutions	Dec 3, 2020	http://bit.ly/FogartyHIVNCD

For more information, visit **www.fic.nih.gov/funding**

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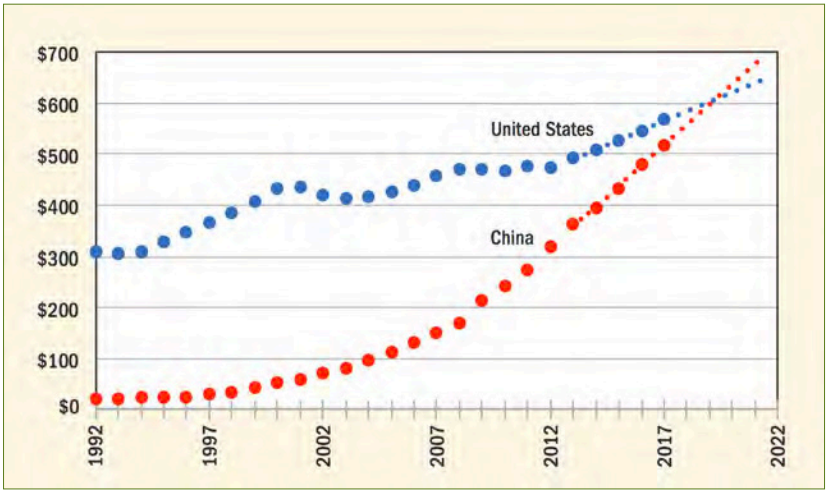
New report warns US leadership in R&D is slipping



U.S. leadership in research and development (R&D) is waning while China's is on the rise, according to a new study from the American Academy of Arts and Sciences and Rice University.

China is increasing its R&D investment by double-digit percentages each year while the U.S. has fallen to tenth place among OECD nations in investment in R&D, measured as a fraction of GDP, according to the report. The lag in U.S. funding is exacerbated by current strains on the research system and higher education, COVID-19, restrictions on foreign researchers and proposed cuts to federal investment in research, the study authors say.

RESOURCE

Full report: http://bit.ly/ChinaRD