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GLOBAL HEALTH MATTERS

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

Three decades of frontier science advances celebrated

By Ann Puderbaugh

Thirty years ago, as the Cold War was ending, the leaders of the major industrialized nations conceived an optimistic vision for a new world order based on strong international partnerships and stunning scientific discoveries. Together, G-7 leaders established the Human Frontier Science Program (HFSP), a research funding body that for three decades has nurtured early-career scientists with audacious ideas and supported global teams to conduct cutting-edge research.

Scientific leaders, policymakers, advocates and grantees gathered recently at the Japanese Ambassador's residence in Washington, D.C. to toast HFSP's accomplishments and recall its genesis.

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Photo courtesy of the Japanese embassy

Japan and the U.S. toasted the 30th anniversary of the Human Frontier Science Program. From left, Japan's Deputy Science Minister Yoshio Yamawaki, NIH Director Dr. Francis Collins, Japan's Ambassador to the U.S. Shinsuke Sugiyama and Fogarty Director Dr. Roger Glass.

$17M awarded to train HIV researchers, reduce stigma

Fogarty has awarded $17 million through two programs to help train HIV researchers in low- and middle-income countries (LMICs) across the globe, and to drive the development of innovative interventions to reduce stigma for people living with HIV/AIDS.

Eleven of the awards, totaling approximately $14 million over five years, will be distributed through Fogarty's HIV Research Training Program, which aims to strengthen the scientific capacity of institutions in LMICs to conduct research on the evolving HIV epidemics in their countries. This round of grants includes nine 5-year international training grants, one 2-year planning grant, and one 3-year award to train researchers on technical, administrative and financial management expertise. These awards will continue to build on Fogarty's more than 30-year legacy of training HIV researchers.

To reduce stigma to improve HIV/AIDS prevention, treatment and care in LMICs, Fogarty is making eight exploratory and developmental grants totaling $3 million over two years. This is just the second round of awards through a new program that aims to lay the foundation for larger intervention studies.

NIH's National Cancer Institute (NCI), National Institute of Mental Health (NIMH) and *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) joined with Fogarty to support the awards.

Funding opportunity announcements for the HIV Research Training Program were recently reissued, with an upcoming application deadline on August 20, 2019.

Full list of awards: http://bit.ly/hivawards

FOCUS

GEOHealth program supports environmental research and training

- New model creates regional hubs as go-to resource
- Grantees form networks to improve living, working environments
- Research topics include pollution, e-waste, neurotoxins and pesticides

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Three decades of frontier science advances celebrated

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HFSP's founders viewed research as a uniting force for progress and prosperity, noted HFSP Secretary-General Professor Warwick Anderson. "They shared the hope, the belief, the understanding that science was a powerful way to promote international cooperation, collaboration and dialogue."

Since its establishment, HFSP has funded about 7,000 scientists in nearly 70 countries, with 28 of them going on to win a Nobel Prize. The organization has grown to include 15 members that jointly support its $55 million annual budget, with Japan and the U.S. providing the largest contributions.

Because HFSP funds high-risk, high-reward research on new areas of inquiry without requiring preliminary results, it can support paradigm-shifting work that lays the groundwork for more conventional funders, such as its U.S. partners, the NIH and the National Science Foundation (NSF).

"We need to celebrate the way in which this has caused advances across the world that have given us insights into how life works, and how disease happens and how to save lives," according to NIH Director Dr. Francis S. Collins. "This has greatly benefited the U.S., for which we are grateful, to have all that talent come to our shores, or to take part in collaborative efforts."

The synergy among organizations is valuable, noted NSF Director Dr. France Cordóva. "HFSP and the NSF share the same goals: to foster research that expands our knowledge at the very frontier of how we understand the physical world, to make it possible to take risks that may have revolutionary payoffs, and to enable the scientific community to push itself further than it has before."

To illustrate the tangible outcomes of HFSP funding, two grantees presented their research discoveries.

Human Frontier Science Program

Annual budget: $55 million

Research project grants: projects must involve a new area of exploration for the scientists and include a multidisciplinary and international research team, which has not previously worked together, with the lead investigator located in an HFSP member country.

Postdoctoral fellowships: postdocs from any country can receive support to pursue a new field of inquiry at the world's best lab in that field.

HFSP members: (in alphabetical order) Australia, Canada, European Union, France, Germany, India, Italy, Japan, the Republic of Korea, Norway, New Zealand, Singapore, Switzerland, the United Kingdom and the United States. **www.hfsp.org**

An HFSP early-career award helped kick-start the career of Dr. Diane Lidke, associate professor at the University of New Mexico. She said her research—visualizing protein dynamics to identify the molecular mechanisms that alter signaling in cancer and the immune response—requires a multidisciplinary approach. "What I really believe in is collaborative science, or really team science, because the kind of questions we're addressing require a broad skill set." A biophysicist, her HFSP support allowed her to expand her network of chemists, computational scientists, mathematicians and medical doctors beyond the U.S. to include collaborators in the Netherlands, Spain, Germany and India. Her work, which is now funded by NIH, has the potential to contribute to cancer treatments and other applications.

Dr. Duncan Irschick, an integrative biologist and inventor at the University of Massachusetts Amherst, said his 2012 HFSP award to investigate the mechanisms geckos use to climb was the kind of passion project that "reminds us why we became scientists." The discoveries from that grant led to development of a patented adhesive called Geckskin, as well as the inspiration for an imaging system known as Beastcam, to create accurate 3D models of life on earth.

Other key advances from HFSP-funded research include discovery of the sonic hedgehog gene, which led to a treatment for basal cell carcinoma; findings that show anti-diabetic agents may provide protection against Alzheimer's disease; and development of nanoparticles that can effectively deliver drugs directly to tumors using swarm behaviors.

HFSP hopes to be able to continue to expand and is reaching out to potential new member countries with strong life sciences programs in Africa, the Middle East and Latin America, according to Anderson.

That bodes well to ensure the next three decades are as exciting and productive, said Fogarty Director Dr. Roger I. Glass, who is NIH's representative to HFSP's board of trustees. "HFSP science is cutting-edge, it's highly competitive, it's interdisciplinary," he said. "It's bringing the best and the brightest from around the world together in teams, united by their tremendous passion and love of science. It's the excitement at the intersection of disciplines that really makes this extraordinary."

Diseases cost Africa $2.4 trillion per year, WHO reports

Nearly 630 million years of healthy life are lost each year in Africa due to disease, taking an economic toll of more than 2.4 trillion international dollars, according to WHO estimates. International dollars are a hypothetical currency unit with the same purchasing power the U.S. dollar has in the United States.

PRODUCTIVITY LOSSES IN AFRICA

Disease or condition	Cost in 2015 International $	%
Infectious and parasitic diseases	808,670,913,758	27.11%
Maternal conditions	45,589,121,253	1.53%
Neonatal conditions	347,336,223,573	11.64%
Nutrition-related conditions	110,312,380,440	3.70%
Noncommunicable diseases	1,107,489,132,375	37.12%
Injuries	290,040,286,090	9.72%
Respiratory conditions	273,749,492,707	9.18%
Total	**2,983,187,560,196**	**100.00%**

Note: This chart uses international dollars, a hypothetical unit of currency that has the same purchasing power that the U.S. dollar has in the United States.

"This is a huge cost to the region and, indeed, for Africa as a whole. Implementing the recommended essential health services to address the main causes of morbidity and premature mortality in the region would almost halve this cost," according to the WHO Regional Director for Africa, Dr. Matshidiso Moeti.

The study—A Heavy Burden: The Productivity Cost of Illness in Africa—presents results by country, regional economic group and income level. The information is designed to be used as an advocacy tool to engage critical stakeholders in member states, economic communities and partners, said Moeti.

Noncommunicable diseases have overtaken infectious diseases as the largest drain on productivity, accounting for 37% of the disease burden. Other culprits for lost healthy years are communicable and parasitic diseases; maternal, neonatal and nutrition-related conditions; respiratory issues and injuries.

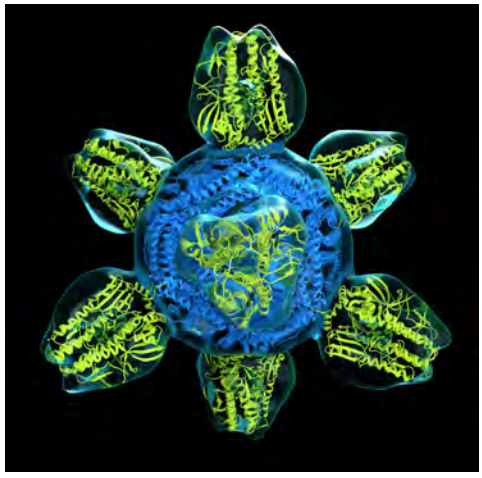
About half, or $796 billion, of this lost productivity value could be avoided in 2030 if the Sustainable Development Goals related to these health conditions are achieved, WHO found.

The full report is available at http://bit.ly/EconAfrica.

NIH begins human trials of universal flu vax candidate

The first clinical trial of an innovative universal influenza vaccine candidate began this spring and will examine the vaccine's safety and tolerability as well as its ability to induce an immune response. Scientists at the NIH's National Institute of Allergy and Infectious Diseases (NIAID) developed the experimental vaccine, known as H1ssF_3928.

Photo courtesy NIAID



Prototype for a universal flu vaccine

The vaccine candidate is designed to teach the body to make protective immune responses against diverse influenza subtypes by focusing the immune system on a portion of the virus that varies relatively little from strain to strain. The vaccine candidate was developed as part of a broader research agenda to create a so-called "universal" influenza vaccine that can provide long-lasting protection for all age groups from multiple influenza subtypes, including those that might cause a pandemic.

Annual flu epidemics worldwide are estimated to sicken 3 to 5 million people each year, resulting in as many as 650,000 deaths, according to the WHO.

NIAID expects the clinical trial to complete enrollment by the end of 2019 and hopes to begin reporting results in early 2020. For more information about the trial, visit ClinicalTrials.gov and search identifier NCT03814720.

PROFILE

Fogarty Fellow sheds new light on Uganda's indoor pollution

Eric Coker, M.S., Ph.D.

Fogarty Fellow:	2017-2018
U.S. Institution:	University of California, Berkeley
Foreign Institution:	Makerere University, Uganda
Research topic:	Pollution and respiratory health

As a Fogarty Fellow in Uganda, Dr. Eric Coker trained local women health workers in data collection, consent and environmental health, and then went out in the field to sample the air in homes in Kampala's slums. He used the data he and his team of health workers gathered to improve understanding of the complex interplay between indoor air quality and poor respiratory health in Ugandan children. Persistent cough is the main reason why children present at government-run health clinics in the Ugandan capital, Coker explained, and the WHO has blamed soot inhaled from household air pollution (HAP) for nearly half the pneumonia deaths among children under 5.

Cooking indoors with solid fuels such as biomass, coal or kerosene is one of the chief sources of indoor pollution, and, over the years, initiatives supported by Fogarty and other NIH Institutes and Centers have sought to reduce HAP by studying clean cookstoves and fuels for use in low- and middle-income countries (LMICs), such as Uganda. But preliminary findings from Coker's fellowship research indicate that projects that are too narrowly focused may not be enough to reduce the health risks posed by HAP.

"Big interventions are being rolled out for cooking fuel replacement and improved cookstoves, but we're seeing insufficient reduction of household air pollution and few health benefits," Coker said. "If we don't take a more comprehensive view of the problem, we may be putting a lot of resources into something that will not have the benefit we'd hoped for. My hypothesis going into the Fogarty fellowship was that we need to consider all sources of air pollution and all the ways available to people to protect their health."

In roughly half the homes Coker sampled in Kampala, meals were cooked indoors. As expected, he found that pollutant levels in those homes were about four times higher than in households where food was prepared outside, and seven times higher than the WHO standard. But Coker also observed wide variations in the prevalence of cough in homes where cooking happened indoors. If windows were opened and children were outside during cooking times, and if the home had electric lights, around 30 percent of children living in the home had a persistent cough, similar to the study population baseline. In homes with kerosene for lighting, where windows were kept shut, smoking indoors was common, children were inside during cooking times, and self-reported traffic-related air pollution was high, the percentage soared to 90 percent of children.

"From the comfort of a postdoctoral office, I would never have been able to understand just how intricately health, indoor pollution and living conditions in Kampala are interwoven," Coker said. "The direct field experience that a Fogarty fellowship offers early-career scientists is hugely important."

His project in Kampala also underscored to Coker the importance of educating ordinary Ugandans about the health hazards they face doing everyday activities like cooking. "In the first home I visited, indoor air pollution levels during cooking were several hundred times higher than what the WHO says is health-protective. And yet, the man of the home was unaware of the hazards this posed. He asked me, 'Is cooking indoors dangerous?'" Coker recalled.

To counter such lack of awareness, Coker advocates community-driven education programs that generate solutions tailored to the local environment. To incorporate basic awareness-building into his fellowship project, Coker had community health workers hand-deliver letters to the people whose homes had been sampled, outlining factors that could be contributing to HAP and steps to take to improve air quality. On a future trip to Uganda, Coker hopes to follow up with the impacted communities and promote more community-driven solutions to HAP and its profound public health impacts.

Q&A

WARWICK ANDERSON, PHD

Professor Warwick Anderson is Secretary-General of the Human Frontier Science Program (HFSP), located in Strasbourg, France. Previously, he was the inaugural CEO of Australia's National Health and Medical Research Council, serving from 2006 to 2015. He earned a Ph.D. from the University of Adelaide and then held research positions at the University of Sydney and Harvard Medical School. He was later head of the School of Biomedical Sciences and a physiology professor at Monash University. Anderson was made a Member of the Order of Australia in 2005.

How did HFSP come into being?

I think it's powerful that this research organization was started at the end of the Cold War by influential politicians in the G-7 such as Prime Ministers Nakasone and Thatcher, and President Reagan. It's significant that the leaders of the seven biggest nations said it's time to emphasize the world needs to work as one, that we need to bring scientists together to build a universal approach to something that is important, which is to advance understanding of ourselves through life sciences research and to together make discoveries that will benefit humankind.

How is it different from other funders?

HFSP is the only research funder where multiple countries put money in a pool to support research projects and fellowships that are awarded centrally. We solicit curiosity-driven proposals that have the potential to transform an aspect of life science. We're also unique in that we don't demand preliminary results, as a matter of fact, they're grounds for disqualification. We require applicants to assemble a multidisciplinary team of scientists who've never worked together before and are proposing to tackle a subject that is new territory for them all. We believe that by deliberately setting up new interdisciplinary collaborations we can make the greatest impact over time. Increasingly, discoveries are being made at the interfaces between disciplines. By putting people from different disciplines together, we find it can light a spark and generate fresh, creative thinking. Also, each nation has its own scientific tradition and type of training. By bringing researchers from different backgrounds together, it can often mean that one plus one equals three.

What funding opportunities do you offer?

Each year, HFSP awards about 30 research grants and 100 postdoctoral fellowships. The research project grants offer up to $450,000 per year to support scientific teams that are international, preferably intercontinental, with the lead investigator located in an HFSP member country. The 3-year fellowships are awarded to postdoctoral scientists from any country, who are courageous enough to change direction and go to the world's best lab devoted to that topic, to work on their idea with the field's top scientists. Since its establishment, HFSP has issued more than 1,100 grants to about 7,000 scientists in nearly 70 countries.

What impact have you had?

I think HFSP funding has produced some completely stunning pieces of discovery. While we are very proud of the fact that 28 of our grantees have gone on to win the Nobel Prize, we're most interested in supporting work that shifts the paradigm. We're looking for original thoughts, risky proposals and are trying to push the world's top scientists out of their comfort zones. Sometimes we have seen fellows take what they've learned and go home to start new departments at their institutions. Also, we've found that the partnerships formed during HFSP projects continue to grow long after the grant ends. In one case, a grant that brought together a small team has now sprouted to include some 500 scientists, who continue to collaborate virtually and even meet annually to share their findings. We're really seeding areas of inquiry that grow into whole new lines of research.

What are your goals for HFSP's future?

We'd like to continue to expand our membership beyond our current funding partners and are now reaching out to other countries with strong life sciences programs in Africa, the Middle East and Latin America. We're in the process of setting up a foundation so that we can also accept charitable contributions. We intend to expand our research grants program and offer larger awards. In addition, we'd like to increase our outreach and convening of past HFSP award recipients, to facilitate new and ongoing collaborations. Finally, we think we can make a contribution by hosting consultations on ways to remove barriers to progress and explore emerging life science topics.

Tackling unhealthy environments: It takes a network

Nearly a quarter of all deaths worldwide—roughly 12.6 million deaths a year—are attributed to living or working in an unhealthy environment, according to the WHO. Pollution, chemical exposures, climate change and other risk factors are linked to more than 100 types of diseases and injuries. There is an economic impact as well. Work-related illnesses and injuries cost the global economy billions of dollars, as reported by the International Labour Organization.

Low- and middle-income countries (LMICs) bear the biggest health burden. Many people, for example, use solid fuels for cooking and heating, exposing them to pollution in their home, in addition to what they may encounter outside. Agriculture, mining and manufacturing, which have a high risk for illness and injury, are large or growing parts of LMIC economies. While urbanization and industrialization are increasing throughout the developing world, most LMICs don't have sufficient numbers of experts trained in the types of research that can guide city, factory and agricultural planning, and support policies to protect people from environmental and occupational hazards.

Fogarty and its funding partners have been among the few organizations to support environmental and occupational health research training in LMICs. The current program uses a "hub" model, creating regional centers for research and training. The hubs together form a network intended to serve as a platform to coordinate activities and provide a credible source for state-of-the-art knowledge on environmental and occupational health.

The West Africa GEOHealth hub is studying workers at an electronic waste site in Accra, Ghana, to better understand the health risks of e-waste recycling.

Photo courtesy The West Africa GEOHealth hub

Known as GEOHealth, short for Global Environmental and Occupational Health, the program's first awards—in the form of cooperative agreements—were issued in 2015. Funding partners invested almost $21 million over five years to establish seven GEOHealth hubs. There are two linked awards for each hub—one to an LMIC institution for research, and the other to a U.S. institution to provide research training. Each hub addresses health threats that are high priorities in their respective regions. Research topics include outdoor and household air pollution, pesticide exposures, environmental contamination, climate change and electronic waste.

The GEOHealth funding partners reflect the multi-disciplinary and global nature of this field of research. Support comes from NIH's National Cancer Institute (NCI), National Institute of Environmental Health Sciences (NIEHS) and Fogarty; the National Institute for Occupational Safety and Health (NIOSH) within the CDC; Canada's International Development Research Centre (IDRC); and the Clean Cooking Alliance, which is providing supplemental funding for research and training focused on household air pollution.

"Environmental and occupational risk factors contribute to the growing burden of noncommunicable diseases—risk factors that can be modified," said Fogarty Director Dr. Roger I. Glass. "The research hubs are designed to develop a critical mass of scientists who understand how the environment triggers disease, identify effective interventions and spur policy changes to improve health."

"The significant exposures to environmental toxins observed in many regions provide compelling opportunities to answer scientific questions and enhance local capacity to collect and analyze high-quality data to inform research and efforts at amelioration," according to NCI's Dr. Robert Croyle.

"Environmental and occupational health problems cross national boundaries, so research and training efforts to understand these problems through our GEOHealth hubs serves not only those affected locally, but all people suffering related issues," said NIEHS Director Dr. Linda Birnbaum. "Working with our partners to create sustainable research and training hubs in underserved countries benefits everyone."

Resources: http://bit.ly/NIHgeohealth

"What we do for work has a significant influence on our health and work-related injury and illness continues to be a major contributor to the global burden of disease, disability, and premature death, said NIOSH's Dr. Sarah Felknor. "The GEOHealth program is an innovative and productive collaboration that leverages investment of funding partners and the needs of academic, research and practice agencies around the world to respond to these difficult issues."

"GEOHealth succeeds by combining the strengths of multiple research funders," said IDRC's Dr. Dominique Charron. "Leveraging each partner's networks and institutional resources allows us to work more effectively and efficiently, increasing regional collaboration while boosting research coherence and sense-making at each hub."

Creating the GEOHealth hub model

The GEOHealth program builds on the success of its predecessor, the International Training and Research in Environmental and Occupational Health program, known as ITREOH. Launched in 1995 with NIEHS and NIOSH as partners, ITREOH funded collaborations between U.S. and LMIC institutions that trained more than 460 scientists at 75 institutions in 43 countries.

In addition to seeding LMIC institutions with expertise, ITREOH produced other notable results. For example, studies of manganese exposure in children in Brazil and Bangladesh linked higher levels of the heavy metal with lower verbal and IQ scores, and more problematic schoolroom behavior. And Chile enacted a comprehensive ban on smoking in public and the workplace following research that found creating smoking and non-smoking areas in bars and restaurants wasn't enough to protect workers. After 16 years, Fogarty and its partners decided to take a new approach to focus investments in a more concentrated way. The program was reengineered and shifted from training individual scientists to building networked science hubs.

The core of each hub is an LMIC institution that aims to become an internationally recognized "go-to" resource for scientists and decision-makers, as Fogarty program officer Dr. Christine Jessup described it. Another goal in strengthening research at these institutions is to make them more attractive for additional funding from NIH or other sources to further enhance sustainability.

These institutions are developing into focal points for collaborative research, data management, training, curriculum development and policy support, in partnership with others in the region. The hubs have established, and will continue to foster, relationships with LMIC government agencies and NGOs to help translate findings into practice and policy.

The Southeast Asia GEOHealth hub based in Thailand, where 40% of workers have agricultural jobs, is studying whether some widely used pesticides act as endocrine disruptors.

Photo courtesy MahidolUMass GEOHealth hub

The cooperative agreements that link LMIC institutions and U.S. collaborators are also key to the model. With the LMIC institution focused on research, and the U.S. partner providing research training to conduct and support sound environmental and occupational health science, the strategy shifts more responsibility to LMIC institutions and builds both their research and administrative capacity. The cooperative agreement mechanism also allows for the involvement of NIH and CDC staff as scientific officers who may provide appropriate assistance and advice in the design of activities, facilitate liaison outreach for partnerships, and help identify and access NIH and other scientific resources.

Forging relationships, expanding reach

The seven hubs are based at institutions in Bangladesh, Ethiopia, Ghana, India, Peru, Suriname and Thailand. Over the past few years, they have been developing their country and regional networks, and expanding their reach in a variety of ways. The hub at the University of Ghana, for example, wanted to create an inclusive regional network representative of West Africa, which includes French- and English-speaking countries. The team in Ghana, an Anglophone country, formed strategic partnerships with Nigeria, as well as Francophone countries including Benin, Burkina Faso, Cameroon, Côte d'Ivoire and Sénégal. To expand its reach, the hub in Suriname forged a partnership with the Caribbean Public Health Agency to connect with the Caribbean Community (CARICOM) nations. In Thailand, where more than 40% of workers have agricultural jobs, the hub's partners include the Thai Ministry of Public Health's Bureau of Occupational and Environmental Diseases, and the Thai Department of Agriculture's Pesticide Research Group. The hub in Peru has established links with three neighboring countries: Ecuador, Bolivia and Chile. The latter is a high-income country that has become a training site and is an example of a south-south partnership.

Understanding the link with disease

Air pollution

Nearly 7 million people die prematurely each year from diseases linked to air pollution—both household and

outdoor. Given the magnitude of the problem in LMICs, four of the seven hubs have made air pollution research their main project.

Because of rapid urbanization, India has some of the world's worst air pollution. The hub team is developing prediction models to estimate daily exposure to air pollution in two large cities, Chennai and New Delhi. The team is also studying the effects on cardiometabolic health outcomes and characterizing the populations most susceptible to exposure given their socioeconomic status, built environment and occupation. The hub, based at the Centre for Chronic Disease Control in New Delhi, brings together experts from fields that include atmospheric modeling, data science, epidemiology and policy translation. Harvard's School of Public Health has a linked award to provide training.

While air pollution is a problem in many countries in sub-Saharan Africa, there's not much data. To fill the gap, the East African hub is studying both outdoor and indoor air pollution. Researchers from the core institution, Addis Ababa University in Ethiopia, and partner institutions in Kenya, Rwanda and Uganda, are conducting continuous air quality monitoring in the four capital cities and are analyzing hospital records to study the effect of particulate matter on morbidity and mortality. They're also looking at air quality and its effect on the lung function of school children. The University of Southern California is the U.S. partner for training.

In Peru, the main project is an intervention trial to determine if liquefied petroleum gas (LPG) stoves are a feasible and effective way to reduce household air pollution (HAP). Researchers recruited women who cook with biomass fuels daily and supplied them with LPG stoves. Investigators are studying the effects on pollution and health, as well as what motivates participants to use the new stoves exclusively. The Universidad Peruana Cayetano Heredia is the core institution and Emory University is the lead U.S. partner with the linked award for training.

Researchers with the GEOHealth hub in Bangladesh are assessing lung function as part of a study of household air pollution.

Photo courtesy Bangladesh GEOHealth hub

The hub in Bangladesh is studying the association between exposure to particulate matter, carbon monoxide and black carbon in HAP, and preclinical markers of cardiopulmonary disease. The team is also investigating whether the pollutants are associated with stable biomarkers of immune dysfunction and inflammation. The effectiveness of LPG stoves is another aspect of the project. The International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) is the principal LMIC institution and is partnered with the University of Chicago for training.

Agricultural health

With agricultural health as its focus, the Southeast Asia hub is investigating whether some widely used pesticides act as endocrine disruptors, which can increase the risk of metabolic syndrome associated with diabetes, stroke, heart disease and other health concerns. The project has expanded to other areas, including the effect of agricultural work on hearing. The hub is based at Thailand's Mahidol University and has partnered with universities in Indonesia. The University of Massachusetts Lowell is the U.S. awardee for training.

Environmental contamination

The Caribbean hub's research focuses on neurotoxicant exposures and their impact on maternal and child health. Researchers are studying the effects of environmental contamination related to gold mining and agricultural development. Analysis includes mercury levels in fish and the amount of pesticides found in produce and rice. Scientists are also exploring whether certain minerals and chemicals have a neuroprotective effect. The hub is based in Suriname at Academisch Ziekenhuis Paramibo and Tulane University is its U.S. collaborator for training.

Electronic waste

Recycling discarded computers and other electronics—known as e-waste—is a growing health threat in many LMICs where recycling practices are often primitive and unregulated. Adults and children working at sites or living nearby can come in direct contact with hazardous substances, inhale toxic fumes, or be exposed to contaminants in soil, water and food. The West African hub is studying e-waste workers and evaluating associations between exposures and the risk of cancer and respiratory problems. An e-waste processing center in Accra, Ghana, believed to be one of the world's largest, is among the research sites providing learning opportunities and bridging fields from epidemiology to chemistry. The University of Ghana is the core institution and the U.S. awardee is the University of Michigan.

Climate change

In addition to their main research projects, three hubs

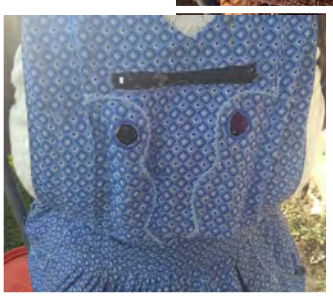
are studying the health impacts of climate change. Bangladesh will explore the effects of temperature change on chronic health outcomes. Peru is investigating its relationship to childhood diarrhea rates. And researchers in East Africa will examine occupational heat stress on workers in key industries, including the flower-growing industry.

Industrialization

In another pilot study, the Bangladesh hub plans to explore the occupational health hazards of industrialization. Through analyzing injury and illness reports, researchers will concentrate on health and safety in the garment industry, which has grown so much over the past few decades that Bangladesh has become the world's second-largest garments exporter.

Building capacity for research

More than 120 trainees have completed or are currently receiving training through the GEOHealth program. Cohorts have included clinicians and public health professionals, medical students and undergraduates. They come from academia, government and NGOs. Top training areas are epidemiology, air quality, biostatistics, pregnancy, heavy metals, toxicology, population studies and health policy.



With a monitoring device placed in the pocket of an apron, the GEOHealth Peru team is studying if liquefied petroleum gas stoves are an effective way to reduce household air pollution.

Photos courtesy Dulce Alarcon, Peru GEOHealth hub

Each GEOHealth hub provides its own combination of learning experiences. There are opportunities for mentored research training through models that include one-on-one and long-distance mentoring, hands-on experience and journal clubs. There are master's, doctoral and postdoctoral opportunities, with master's being the most common. Short courses and workshops in ethics, manuscript production and other subjects also are offered.

Training is linked to research and is producing results in multiple ways. To prepare for air pollution studies in East Africa, for example, LMIC investigators and their teams were taught how to install, use and maintain air quality monitoring equipment and were certified in spirometry to assess lung function. Trainees and scholars also often have roles in the research projects the hubs are conducting as part of the grants. And some hubs have already reported their trainees are sharing the laboratory techniques and other skills they learned with their colleagues.

Together the GEOHealth hubs have produced more than 30 publications, with over a third including trainees as authors and the majority including at least one LMIC author. And there are other measures of success. For example, the hub in Peru started a master's program in environmental health and awarded five scholarships to members of the first cohort of trainees. Ghana also has launched a similar master's program at the Kwame Nkrumah University of Science and Technology. Nine trainees in the Caribbean hub are enrolled in a new Ph.D. program at Anton de Kom University of Suriname, and 97% of the trainees in the 2014-2016 cohorts who completed the master's in public health program got jobs in the field.

Plans for future growth

The hubs continue to form new relationships in their regions to help further their research, provide more training opportunities and inform practice and policies. Now that investigators have had time to solidify their regional roles, they've started collaborating across the network. A workshop on air pollution, climate and health hosted by the India hub was attended by members of the teams in West Africa and Bangladesh. Participants from India, Bangladesh and Peru joined colleagues in East Africa for a hands-on workshop on indoor air pollution research. In addition, the Suriname hub invited trainees from other hubs to attend workshops it has held.

Looking ahead, the funding partners reviewed progress and have developed a program concept that was presented to Fogarty's advisory board and posted online in February 2019.

OPINION

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

Academia can benefit from engaging in global health

Why should an academic health center engage in global health? There are many potential benefits—to satisfy student demand and better prepare them to be global citizens, attract and retain excellent faculty, win increased grant funding, expand the organization's philanthropic base, advance scientific discovery and enhance the overall educational experience.

Of course, there are barriers as well—physicians' time is precious and it's costly to provide them with opportunities that take them away from clinical duties. In some institutions, global health activities are not viewed as valuable learning experiences, and there may be accreditation issues—but with the commitment of leadership—these can be overcome.

We know that wherever a global health program is launched, administrators have seen a huge surge of student interest in enrolling. A growing number of students and faculty say they are even selecting institutions based on the foreign experiences they offer. Working in a low-resource setting overseas not only helps students and faculty develop a global mindset, it also sensitizes them to different cultures, equity issues and the social determinants of health. These immersive experiences can provide unique transformational learning opportunities that produce valuable insights. Participants are able to enhance their ability to recognize, diagnose and treat diseases that are rarely seen at home. They're forced to adapt to the challenges of working in low-resource settings, which can open their mind and encourage flexibility and creative thinking. Perhaps more importantly, global health engagement reinforces the values of the medical and public health professions, and affords the opportunity to engage in rewarding work, which helps prevent burnout.

Global health expands the synergy between training, service and research—the cornerstone of academic medicine. It broadens the horizons for the type of research that institutions can conduct. That, in turn, creates new opportunities to compete for the growing portion of the NIH budget that supports global research. It also enables bi-directional learning by exposing students and faculty to new approaches and different ways of thinking.

By taking science where the problems are there is much we can learn. For instance, retinoblastoma is more common in India than anywhere else in the world. Why is that? What can we learn from conducting studies there? In a similar vein, there is an extended family in Colombia with an inherited form of early-onset Alzheimer's disease. By establishing research partnerships and helping to build capacity there, we are enabling scientists to investigate how this terrible disease might be halted at its earliest stage. Imagine the immense savings—both financial and in terms of human suffering—a cure could bring.

We've seen that many breakthroughs in the treatment and prevention of HIV/AIDS were made in low- and middle-income countries (LMICs), and these inform our domestic response to ongoing epidemic in U.S.

As our own medical costs continue to skyrocket, we've begun to look overseas for more economical—yet equally effective—approaches to treatment. For instance, the standard of care for children with hydrocephalus in the U.S. used to be surgically implanted shunts. But it's expensive to place the shunts and they require revisions as the child grows. From research in Uganda, we now have proof that a simpler, more cost-effective treatment is possible. It's now being adopted in the U.S. and has the potential to save more than a billion dollars a year.

For institutions considering their bottom line, global health can also prove to be a wise investment. Many philanthropic funders are interested in global health, which can diversify the donor base and enable growth. Global health activities can also expand the number of NIH and other research grants an institution can receive, creating jobs on campus and boosting the local economy. About 90% of every dollar the U.S. government invests in global health research and development goes to U.S.-based researchers. That generated an estimated 200,000 new American jobs and $33 billion in economic growth from 2007 to 2015, according to the Global Health Technologies Coalition.

Measured another way, global health programs can attract and engage top-tier students with a passion for international work, and global health in particular. Many have described their field experiences as "life changing." After all, how can we put a price tag on the opportunity to improve the lives of the world's most vulnerable people?

PEOPLE

Malpass selected as new World Bank president

David Malpass is the new president of the World Bank Group, a global partnership to reduce poverty and build shared prosperity in developing countries. Malpass, an international economist, most recently was the Treasury Department's Under Secretary for International Affairs. His 5-year term at the World Bank started in April.

Fogarty grantees named Royal Society Fellows

Two scientists with ties to Fogarty have been elected Fellows of the Royal Society, the world's oldest independent scientific academy, dedicated to promoting excellence in science. Dr. Gagandeep Kang, a grantee and Executive Director of the Translational Health Science and Technology Institute in India, is known for her studies of enteric infections and their impact on children.

Dr. Salim Abdool Karim, who held a longtime AIDS research training grant, is internationally recognized for HIV/AIDS and tuberculosis research, including studies showing antiretrovirals prevent sexually transmitted HIV infection and genital herpes in women. He directs the Centre for the AIDS Programme of Research in South Africa (CAPRISA).

Genome organization recognizes Happi

The Human Genome Organization conferred its 2019 HUGO African Prize to Dr. Christian Happi for contributions to genomics and infectious diseases. A professor of molecular biology at Redeemer's University in Nigeria, Happi is a member of the NIH-funded Human Heredity and Health in Africa (H3Africa) consortium.

Former IOM President Hamburg has died

Dr. David Hamburg, who from 1975-1980 was president of the Institute of Medicine (now the National Academy of Medicine), died in April. A psychiatrist dedicated to global health, human rights and prevention of violence, he received the Presidential Medal of Freedom in 1996.

Baker honored as immunization champion

The Sabin Vaccine Institute presented its 2019 Albert B. Sabin Gold Medal to Dr. Carol Baker for her contributions to immunizations, most notably *Group B Streptococcus* research. Baker, an adjunct professor at the University of Texas Health Science Center, has received NIH funding for her research.

Leading geneticist freed from prison

Dr. Muntaser Ibrahim, who was arrested at a political rally in Sudan in February, was released in April along with other academics following a transition of power. A geneticist at the University of Khartoum, Ibrahim is part of the NIH-supported Human Heredity and Health in Africa (H3Africa) consortium.

WHO studies gender bias in global health

A new report examines the unique barriers females face in global health. While care is largely delivered by women, it is led by men, the WHO report said. The gender gap is exacerbated in academic medicine, where only about one-third of the deans are women and men author about 70% of all publications.
Full report: http://bit.ly/LedByMen

Path determined for AI in medical imaging

NIH and radiology societies have mapped a pathway for translational research on the use of artificial intelligence in medical imaging. The report identifies research priorities that leverage big data, the cloud and machine learning for augmenting clinicians' ability to make diagnoses or assess patients' responses to therapy.
News release: http://bit.ly/AIimaging

CSIS examines global nutrition

A policy primer on the role of nutrition as a foundation for global health, economic growth and political stability was launched recently by the Center for Strategic and International Studies. The interactive website provides an overview of the priority issues, key players and U.S. investments.
Website: www.csis.org/features/nutrition-prosperity

New tool helps with manuscript formatting

To speed up journal article submission, an NIH team has created a freely available web tool that enables users to quickly produce journal title pages. Once a spreadsheet of author details is uploaded, the information can easily be formatted to suit individual journal requirements.
Website: https://authorarranger.nci.nih.gov

Big data website facilitates collaboration

Scientists can access big data and tools to help interpret complex studies through the Clinical Epidemiology Database, funded by the Bill and Melinda Gates Foundation. It includes data from two large enteric disease studies.
Website: www.ClinEpiDB.org

Some global health grads struggle for jobs

A study of recent graduates with master's degrees in global health showed about 20% were not employed or enrolled in further training. The online survey was distributed to students from eight U.S. universities and generated 152 responses. Of those employed, nearly 70% reported limitations or gaps in their training.
Publication: http://bit.ly/GradsReport

Funding Opportunity Announcement	Details	Deadline
Global Infectious Disease (GID) Research Training Program D71 D43 Clinical Trial Optional	http://bit.ly/IDtraining	July 25, 2019
Fogarty HIV Research Training Program D43 Clinical Trial Optional D71 Clinical Trial Not Allowed G11 Clinical Trial Not Allowed	http://bit.ly/NIHGlobalHIV	Aug 20, 2019
Fulbright-Fogarty Fellows and Scholars in Public Health	http://bit.ly/Fulbright-Fogarty	Oct 8, 2019
Global Brain and Nervous System Disorders Research Across the Lifespan R21 Clinical Trial Optional R01 Clinical Trial Optional	http://bit.ly/NIHGlobalBrain	Nov 7, 2019
Emerging Global Leader Award K43 Independent Clinical Trial Required K43 Independent Clinical Trial Not Allowed	http://bit.ly/NIHGlobalLeader	Nov 7, 2019
Noncommunicable Diseases and Disorders Research Training Programs in LMICs D43 Clinical Trial Optional	http://bit.ly/NCDtrain	Nov 12, 2019
Ecology and Evolution of Infectious Diseases Initiative (EEID) R01	http://bit.ly/EEIDNIH	Nov 20, 2019

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

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NIH database provides international clinical trial regulations

NIH has expanded its free, online database of international clinical trial regulations to include information from 20 countries. The site also now offers real-time updates of regulatory changes to its email subscribers. It was launched in 2014 by the NIH's National Institute of Allergy and Infectious Diseases. Since then, it has served more than 68,000 users from 157 countries. The resource includes listings of regulatory authority, ethics committee, clinical trial lifecycle and sponsorship. It also provides regulatory authority contact information, and estimated application review and approval times.

RESOURCE

Website: https://clinregs.niaid.nih.gov