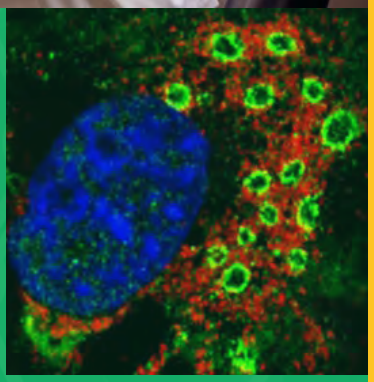
FOGARTY
INTERNATIONAL CENTER

Strategic Plan



U.S. DEPARTMENT OF HEALTH
AND HUMAN SERVICES

National Institutes of Health

ADVANCING SCIENCE
FOR GLOBAL HEALTH

Decades before phrases like "globalization" and "multiculturalism" became commonplace, Rep. John Edward Fogarty (D-RI) advocated for international health research to reduce suffering and foster peace and prosperity throughout the world. Over the course of his 27 years in Congress, Fogarty was a champion for NIH and for the value of medical research. During his tenure as Chair of the Appropriations Subcommittee with responsibility for health funding, the budget for NIH grew from $37 million in 1949 to $1.24 billion in 1967.

Over the years, Fogarty repeatedly, but unsuccessfully, argued for the creation of an international health research institute to promote the study of global health problems. His sudden death of a heart attack on January 10, 1967, provided the catalyst that finally brought his "Health for Peace" center into existence in July 1968. Since then, the John E. Fogarty International Center has assumed a prominent place in the global health community, funding research and building sustainable research capacity at home and abroad.

"I visualize this center … as representing the visible and tangible embodiment of this nation's devotion to the use of science for peaceful purposes and the good of mankind."

Rep. John Edward Fogarty
1913–1967

VISION

The Fogarty International Center's vision is a world in which the frontiers of health research extend across the globe and advances in science are implemented to reduce the burden of disease, promote health, and extend longevity for all people.

MISSION

The Fogarty International Center is dedicated to advancing the mission of the National Institutes of Health by supporting and facilitating global health research conducted by U.S. and international investigators, building partnerships between health research institutions in the U.S. and abroad, and training the next generation of scientists to address global health needs.

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MESSAGE FROM THE DIRECTOR

Dr. Roger I. Glass

Dear Colleagues
and Friends,

These are exciting times for global health. Over the past decade, the world has come together to continue and expand programs in low- and middle-income countries (LMICs) to achieve the Millennium Development Goals and set new aspirational targets for the future—to consider the possibility of a generation without HIV/AIDS, to decrease under 5 mortality to 20 deaths per 1,000 by 2035, and to embrace the burgeoning problem of non-communicable diseases. These goals, while ambitious, are within reach because of significant research advances and implementation of health programs with levels of funding that could not have been imagined a decade ago. They also reflect the recognition by many leaders that this support to improve health is not only important for humanitarian reasons, but imperative for economic development, for political stability, for science and for long-term growth.

What has Fogarty done in the past and what can we do in the future to continue to make our mark on the research and training agenda for global health? When I travel, I am always amazed and gratified by the number of outstanding researchers, young and old, who introduce themselves to me and thank me for the support Fogarty has provided that has helped them start and establish their careers in research. Grantees from our first extramural program 25 years ago built collaborations between U.S. and foreign investigators and institutions in HIV/AIDS research that have trained a cadre of outstanding researchers at home and abroad. These trainees of yesterday have become well-recognized leaders in the field today. This concept of investing in training outstanding young investigators, both U.S. and foreign, and linking them early in their careers in research partnerships between their institutions has been a winning strategy that has had a major impact on the research enterprise for global engagement. It remains at the core of our programs at Fogarty and forces us to take the long view—to train the next generation of researchers in areas of global health where we think the field is moving and where the most interesting discoveries are yet to be made.

We've identified several directions that seem to have great growth potential and merit our attention. Fogarty programs to address the rising tide of chronic illness and non-communicable diseases (NCDs) must be strengthened and expanded. In many parts of Africa, efforts to prevent and treat HIV/AIDS, malaria, and TB over the past decade have reversed the precipitous decline in life expectancy seen in the 1990s. In other LMICs, life expectancy has approached or passed 70 years. These countries now share the same health challenges that we are facing in the United States. Heart disease, cancer, diabetes, mental illness and other chronic diseases are the main causes of death and disability here at home and are expanding globally. We must focus our attention on these problems and discover new ways to prevent and treat them. Today, global health and local health are becoming one and the same and research anywhere can help people everywhere.

Secondly, we believe it is critical that we find new ways to harness the huge upsurge of interest by students at all levels in issues of global health. In order to solve the increasingly complex global health problems, we must expand our efforts to spur innovative solutions by engaging multidisciplinary teams with skills not traditionally related to health, such as engineering, business, economics and law. In addition—given the emergence of NCDs as the next global challenge—we need to attract young investigators with diverse specialties including cardiology, oncology, neurology and mental

health, and other topics that in the past were not considered in the realm of global health.

In our increasingly wired world, it is imperative that we redouble our efforts to incorporate information and communication technology (ICT) into our research and training programs. Our grantees and partners are producing novel teaching tools and electronic resources that make knowledge about disease and prevention freely available to all. E-learning is a powerful way to enable physicians and medical personnel at all levels to gain access to the ever-expanding and changing knowledge base that can keep them up to date throughout their careers. Now that more people in LMICs have cellphones than toilets, we see growing opportunities to adapt mobile applications to improve access to populations for research and provision of care. While the potential is great, it is important that we carefully study and evaluate the most effective ways to incorporate these new ICT tools and resources into the practice of medicine, public health and research.

Implementation science was a cornerstone of our last Strategic Plan, and remains a high priority if we are to ensure that proven interventions are actually delivered and scaled up effectively. This challenge continues to require a cadre of researchers who are trained to generate the evidence required to move discoveries into practice. Increased efforts are now needed to catalyze partnerships and improve communication between the scientific community and program implementers and decision-makers, so that science informs program and policy, and research is responsive to program and policy needs.

Today, interest in global health is tremendous but funding, as always, is limited. One way to leverage our impact is by building partnerships with groups that share our interests and passion. Within NIH, most of Fogarty's programs receive co-funding from many of the Institutes and Centers that see value in our training activities, our overseas networks and in our efforts to strengthen LMIC institutions to enable the conduct of meaningful research that is both ethically and properly administered. Beyond NIH, we have longstanding partnerships with organizations such as the National Science Foundation, the President's Emergency Plan for AIDS Relief and the Bill and Melinda Gates Foundation, and see tremendous opportunities to extend these even further. We also have new relationships with a number of medical research organizations globally to coordinate our endeavors and, increasingly, to provide parallel funding for scientific projects of mutual interest and benefit.

In summary, Fogarty's strategy moving forward will be to build on the strong and productive roots of our past. We will continue to emphasize training and research but will redirect our programs to include the changing burden of disease in LMICs—the NCD agenda. We will capitalize on the enthusiasm for global health on campuses around the country and will provide new opportunities to apply the diversity of skills and interests of future graduates to some of the most challenging health problems of our time. We have a strong track record upon which to build, a number of areas where we see the potential for innovative research over the next few years, and the prospect for developing and sustaining fertile partnerships that will seed the next generation of global health researchers.

Many thanks for your continued support!

In partnership,

Roger I. Glass, M.D., Ph.D.
Director, Fogarty International Center
Associate Director for Global Health Research, NIH

STRATEGIC PLAN GOALS

GOAL 1

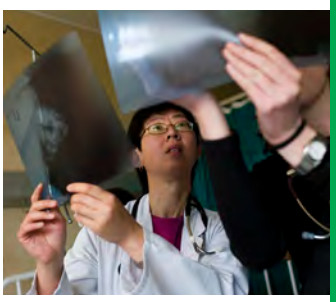
Build research capacity through INDIVIDUALS, INSTITUTIONS, *and* NETWORKS *to meet future and evolving global health challenges*

Strategic Priorities

- Support training of INDIVIDUALS to build future research leaders in the U.S. and low- and middle-income countries.
- Invest in INSTITUTIONS as sustainable platforms for research in low- and middle-income countries.
- Promote research NETWORKS.
- Stimulate linkages among disciplines to address complex global health problems.

GOAL 2

Stimulate innovation in the development and implementation of technologies and other locally relevant solutions to address global health problems



Strategic Priorities

- Support the enhanced use of information and communication technologies to facilitate and improve health research education.
- Encourage innovation in the development and implementation of mobile and other technologies, systems, and policies to address global health problems.

GOAL 3

Support research and research training in implementation science

Strategic Priorities

- Expand investment in research and research training in implementation science across programs.
- Catalyze interaction between researchers, policymakers and program implementers to promote uptake of evidence into global health policy and practice.

GOAL 4

Advance research on prevention and control of the dual burden of communicable and non-communicable diseases and disabilities

Strategic Priorities

- Support research and research training in clinical, behavioral and population sciences.
- Identify ways to leverage investments in communicable diseases, including HIV, to better address the dual burden of disease.

GOAL 5

Build and strengthen partnerships to advance global health research and research capacity

Strategic Priorities

- Engage and support the NIH Institutes and Centers to advance their research agendas for global health.
- Forge partnerships at home and abroad to leverage complementary interests and strengths.
- Convene global experts to address priority research questions and catalyze new areas of science.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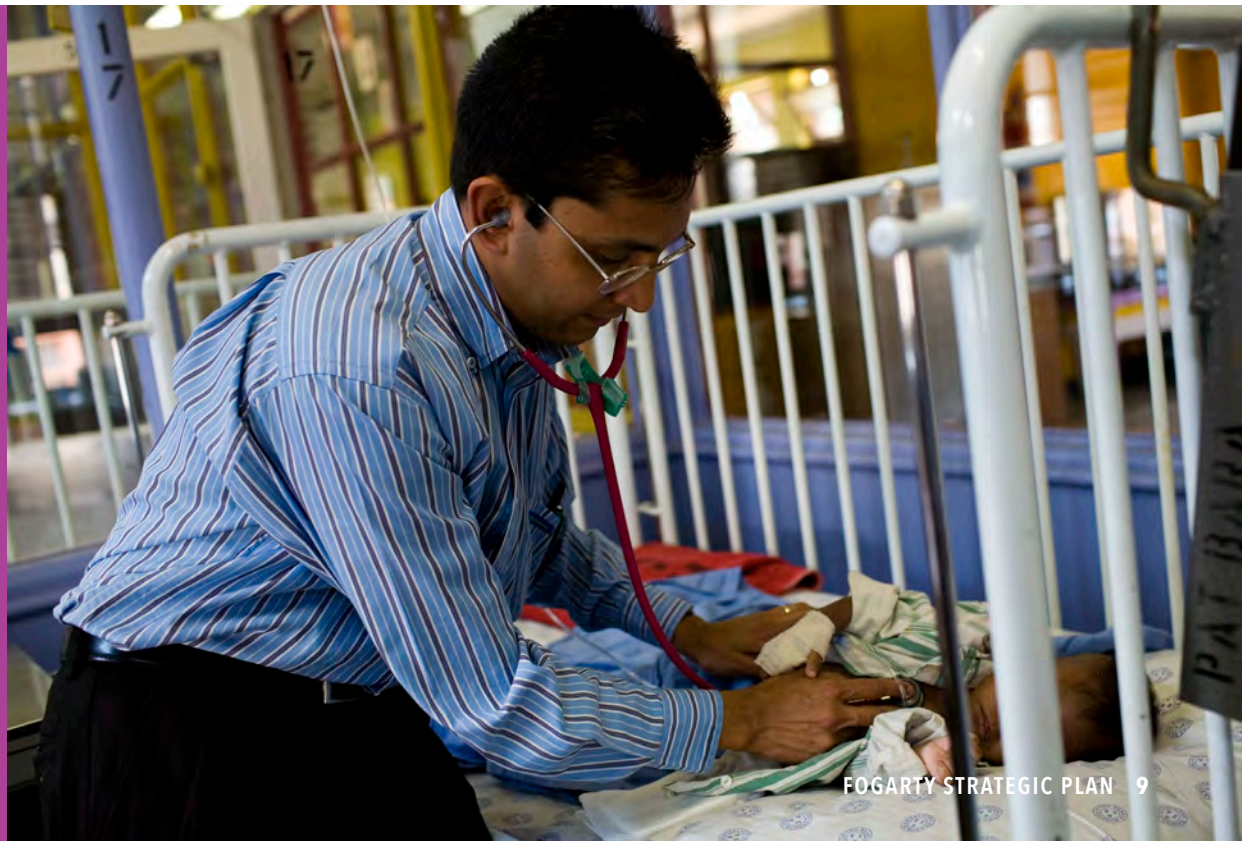
A GLOBAL IMPERATIVE TO IMPROVE HEALTH

In every region of the world, the Fogarty International Center advances the NIH mission to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability. For Fogarty, this mission translates into advancing science and strengthening research capacity in areas of the world where resources are limited and challenges to health–the dual burden of communicable and non-communicable diseases, poverty, inadequate water and sanitation, limited health infrastructure, and adverse environmental exposure—are daunting. Fogarty investments accelerate the pace and progress of research, expand the scientific enterprise by building capacity at research institutions across the globe, and, most importantly, develop the knowledge and evidence needed to confront health challenges wherever they occur. By taking science to where the problems are, and by supporting research and research training in areas where the burden of disease is greatest, Fogarty investments will continue to build the health research workforce of the future while bringing scientific inquiry to bear on some of the world's most complex health problems affecting populations both at home and abroad.



These are exciting times for global health, with new opportunities for partnership, the introduction of transformative technologies, and scientific priorities that are evolving to match the changing burden of disease. Capitalizing on these developments demands a nimble and multidisciplinary research workforce that can function across cultures and borders to solve health problems. Fogarty will continue to support research and research training programs that train the best and brightest researchers around the world and facilitate scientific collaboration. Fogarty will also encourage innovation in research and capacity building.

Fogarty's 2014 Strategic Plan will advance the global health research agenda by building on past and current Fogarty investments and successes in a way that responds to the changed landscape in global health. This vision is outlined in five main areas: building research capacity to meet current and future global health challenges; stimulating innovation in the development and evaluation of technologies to address global health problems; supporting research and research training in implementation science; advancing research on prevention and control of communicable and non-communicable diseases and disability; and building partnerships to advance global health research and research capacity. Fogarty investments will continue to advance the goals and sustain the leadership of the NIH and the U.S. government in biomedical research, while improving the health of Americans and populations across the globe.

GOAL 1

Build research capacity through
INDIVIDUALS, INSTITUTIONS, *and* NETWORKS
to meet future and evolving global health challenges

Based on 25 years of experience in global health research training, Fogarty will continue to invest in building current and future leaders in global health research, strengthening the long-term capacity of research institutions to be sustainable platforms for cutting-edge science, and catalyzing meaningful collaborations between and among institutions. Together, these investments comprise a continuum of capacity-strengthening that is uniquely supported by Fogarty.

▶ *Strategic Priority*

Support training of INDIVIDUALS *to build future research leaders in the U.S. and low- and middle-income countries*

The most important resources in global health research are people. These critical resources must be renewed and diversified. Addressing today's complex global health challenges requires a critical mass of first-class scientists who are well versed in regional health problems and understand the cultural, social, economic, and political context that influences the effectiveness of interventions.

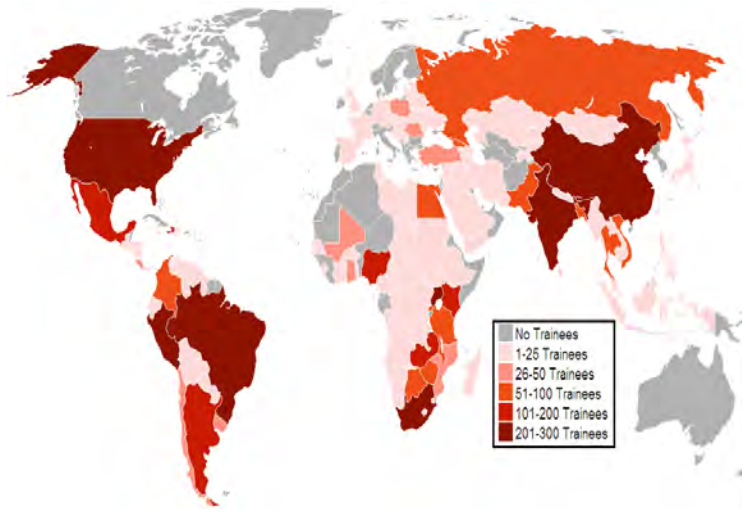
Invest in future U.S. global health research leaders

In an effort to harness the energy and significant interest in global health at U.S. universities, Fogarty will continue to support the training of early-career scientists at research centers in LMICs, enabling them to understand the diverse health challenges and opportunities of working in low-resource and international settings and to establish partnerships with local researchers to tackle complex global health issues. Fogarty supports these hands-on, clinical research training experiences in low- and middle-income countries (LMICs) in close partnership with an increasing number of NIH Institutes and Centers. Through these programs, Fogarty and its NIH partners provide experiences that

Fogarty International Clinical Research Scholars and Fellows Program

Over the last decade, American university campuses have seen a soaring interest in global health among students and faculty from a wide range of fields. Since 2004, Fogarty has met this interest by providing individual support to more than 500 fellows (postdoctoral students and M.D.s) and scholars (current Ph.D.s and M.D. students) for hands-on, clinical research training experiences in low- and middle-income countries (LMICs). Participants have published more than 750 articles in peer-reviewed journals, presented research findings at numerous scientific meetings, and used their research training to make practical improvements and advancements in treating disease. Most important, many have launched their careers in global health.

Fogarty Trainees 1988-present



encourage young U.S. investigators to take risks and approach problems creatively and collaboratively under constraints that may not exist in high-income settings. These highly motivated individuals often build lasting professional relationships with their peers in LMICs and go on to conduct research that addresses health needs of the U.S. and LMICs.

Invest in future LMIC research leaders

Fogarty has supported the training of thousands of scientists in LMICs who, with their intimate knowledge of the local context, are uniquely poised to make discoveries in global health research. Many of these investigators have become leaders in academic institutions and ministries of health in their home countries, and are involved in national efforts to improve the health care of the local population. Fogarty grants have also catalyzed a cycle of sustainable research training, whereby the first generation of trained foreign investigators trains subsequent generations of scientists, leading to a compounded return on scientific investment.

Fogarty supports unique training programs for LMIC scientists that are grounded in long-standing partnerships between research institutions in the U.S. and in LMICs. These programs extend the international scientific reach of the U.S. institutions, while creating novel pathways for mutual learning and benefit. Past Fogarty investments have multiplied the number of foreign investigators working abroad, who serve as change agents within their institutions, become leaders, and participate in international scientific networks. Fogarty programs have supported long-term research training for over 4,500 scientists in more than 100 countries, in collaboration with over 230 U.S. and LMIC research institutions. Many trainees have gone on to conduct groundbreaking research with major impact. Fogarty will continue to support innovative training and research programs for LMIC scientists.

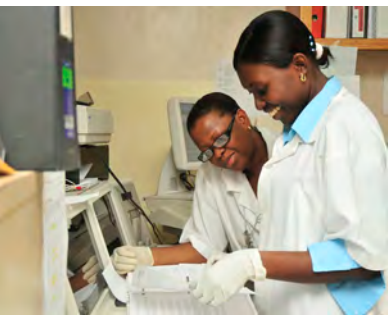
Promote pathways to research independence

A robust global health research workforce requires that talented investigators from LMICs have opportunities to establish independent research careers. A strong career pipeline ensures that investments in research training can build research leaders who remain in-country to advance science locally and internationally and help train the next generation of scientists. The pipeline leading to scientific independence for foreign researchers is particularly vulnerable during the postdoctoral phase, where there is little funding for new researchers and the mentored research experiences that foster research independence can be difficult to obtain. To address this critical juncture, Fogarty will continue to support career development for promising LMIC scientists at foreign institutions to ensure they can launch a successful and independent research career.

▶ *Strategic Priority*

Invest in INSTITUTIONS *as sustainable platforms for research in low- and middle-income countries*

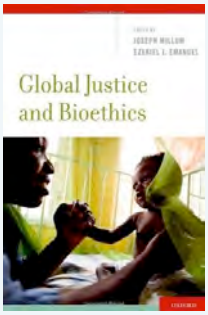
Fogarty also supports efforts to strengthen research capacity at the institutional level. Academic institutions are an integral part of the health system. As centers for scientific discovery, excellence in service delivery and training of future leaders, they play a unique and powerful role in stimulating their researchers and key stakeholders to address priority health problems. Despite the many challenges faced by academic institutions in resource-poor settings, they are highly capable of substantial contributions to the health of their communities, countries–and by extension, to global health. A sustainable base of research institutions in LMICs can help advance the development of priority

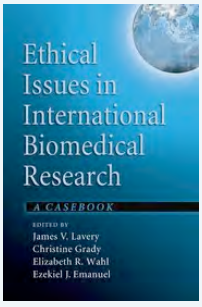


interventions for global health, with these institutions serving a critical role in generating solutions and training the research workforce of the future.

Fogarty strengthens institutional research capacity by investing in programs such as research ethics, library sciences, research management, and informatics. Moreover, a strong research environment helps to ensure that scientists remain in their home institutions to conduct research. This also enables institutions to serve as centers of excellence that can attract international scientific collaboration and retain staff. Research ethics capacity, for example, provides the impetus and skills to strengthen ethical review and oversight of research within an institution, helping to foster a culture of scientific rigor and independence. Research management

Strengthening International Research Ethics Capacity: Fogarty's Bioethics Program





The protection of human subjects is essential to the conduct of sound, ethical research. In light of increased international collaborations and clinical trials abroad, trained individuals and institutional frameworks are needed to ensure that any research conducted is held to high ethical standards and human subjects are adequately protected. As the success and credibility of major national and U.S. investments in clinical trials and other health research studies depend on strong local ethics review boards and appropriate national regulations, building research ethics capacity in LMICs is critical.

Fogarty's International Research Ethics Education and Curriculum Development Award ("Bioethics") program supports the development of culturally relevant bioethics curricula for LMIC scientists, while also supporting training to produce leaders who can advise LMIC institutions on formulating and strengthening local bioethics guidelines, build well-informed review bodies capable of evaluating research proposals, and train others in the principles of ethical research conduct. In the last decade, Fogarty has enabled over 560 LMIC scientists, academics and health professionals to complete master's level training in bioethics.

For example, Nigerian grantee Dr. Clement Adebamowo has provided ethics training to over 1,000 West African researchers, drafted the Nigerian National Code for Research Ethics, and established a web-based research protocol tracking system for the country.

capacity promotes stronger financial and grants management capabilities within these institutions, enabling more accountability, transparency and research competitiveness. Finally, given the exponential increase in biomedical information and computer-based tools available for access and analysis, individuals with advanced training in informatics are essential to facilitate high-quality and cutting-edge research.

▶ *Strategic Priority*
Promote research NETWORKS

Building on investments in individual research institutions, Fogarty is now supporting networks, enabling institutions to leverage each other's strengths. By supporting such interactions, Fogarty aims to facilitate collaboration and information sharing, ultimately helping to develop relationships between research institutions that serve as centers of excellence and regional resources for training, data management, and multidisciplinary research.

Fogarty will support networks of institutions in several ways. First, Fogarty will continue to invest in the development or expansion of multidisciplinary centers for global health research. These centers or hubs serve as focal points for research, research training, and collaborative activities around specific global health topics. These hubs form links, or "spokes," to other local institutions enabling the development of regional research collaborations that leverage unique strengths of respective institutions, expand research training opportunities, and support the science needed in order to inform nationally-relevant policy development.

Second, Fogarty will continue to invest in network models such as the Medical Education Partnership Initiative (MEPI) that supports a large network of African medical schools that are recruiting and retaining well-qualified faculty, employing state-of-the-art teaching tools, developing regional training centers, and upgrading technology to enable distance learning and resource sharing among institutions. Direct funding to African institutions in this model encourages local ownership and allows each institution to adapt the program to suit its unique resources and local health needs.

Finally, some of Fogarty's long-term investments have trained a critical mass

Lasting Capacity: The Formation of a Regional Informatics Network

Dr. Patty Garcia's first connection with Fogarty was as a trainee with the AIDS International Training and Research Program (AITRP). Dr. Garcia went on to receive further NIH grants, and, following a few years as Chief of Peru's National Health Institutes, now serves as Professor and Dean of the School of Public Health at Universidad Peruana Cayetano Heredia (UPCH).

In collaboration with the University of Washington and with support from Fogarty's Informatics Training for Global Health program, Dr. Garcia has built informatics capacity at UPCH over the past 14 years, and most recently created the Andean Global Health Informatics and Training Center as a regional center of excellence, initially in partnership with universities in Colombia and Ecuador. She has led efforts to establish certificate and master's programs in informatics at UPCH, and organized a pan-Latin America informatics and health summit and a pan-Latin America Symposium on mHealth. Over the last 25 years, UPCH has built a diverse, highly regarded research portfolio and currently holds over 20 NIH grants and contracts.

of researchers and leaders, enabling the emergence of regional networks in areas such as informatics and bioethics.

▶ *Strategic Priority*

Stimulate linkages among disciplines to address complex global health problems

Global health challenges are often embedded in relationships with biological, social, economic, political, and environmental determinants. Some of the most transformative advances in science and technology have come by bringing together collaborators from different disciplines to arrive at novel solutions. Indeed, collaborative research across disciplines fueled the development of such fields as genomics, nanobiology, bioinformatics, behavioral science, and systems biology and is producing cutting-edge advances in every field of health-related research, from cancer to immunology, brain disorders, blindness, and infectious disease. Fogarty will support research training that encourages scientists to think and work across disciplines, form lasting working relationships with colleagues in different fields, and develop new models for problem-solving that draw upon a wide range of expertise in disciplines as diverse as law, economics, business, information technology, and engineering. In doing so, Fogarty will stimulate innovation in interdisciplinary approaches to global health research training, incentivize new collaborations, and increase the pipeline of researchers from a variety of fields.

The information and communication technology (ICT) revolution presents exceptional opportunities and new tools for global health research and research education. Scientists across the world are more connected than ever before due to the speed and ease with which so many can communicate using these tools. Fogarty will expand its support of innovation in the use of ICT to facilitate knowledge generation, scientific exchange and research education.

Fogarty's divisions work together to support global health research and research training activities within the Center and across the NIH.

DIVISION OF INTERNATIONAL TRAINING RESEARCH:

Research and research training at home and abroad

The Division of International Training and Research administers research grants, training grants and fellowship programs at institutions in more than 80 countries. Fogarty programs that build the research pipeline are anchored to peer-reviewed research grants and designed to be collaborative, long-term and flexible. Over a quarter of Fogarty awards are made directly to research institutions in low- and middle-income countries, while the remaining grants are made to U.S. institutions that collaborate with institutions in low- and middle-income countries. About one-fourth of Fogarty's investments focus on scientific discovery, and three-fourths support research training.

DIVISION OF INTERNATIONAL SCIENCE POLICY, PLANNING AND EVALUATION:

Planning for future global health needs

The Division of International Science Policy, Planning and Evaluation provides strategic guidance to Fogarty's director on the development, analysis and evaluation of Fogarty's programs and on international science policy issues. The division tracks activities of international funding agencies and research trends in global health, and advises Fogarty's director on legislative and partnership matters. This division also manages Fogarty's Center for Global Health Studies, which serves as a hub for project-based scholarship and a platform for dialogue and international collaboration on emerging priorities in global health research and research training.

DIVISION OF INTERNATIONAL RELATIONS:

Catalyzing new research partnerships through diplomacy

The Division of International Relations facilitates new partnerships among U.S. scientists, institutions and counterparts abroad to advance research and training in the biomedical and behavioral sciences. The division works on behalf of Fogarty and the whole of NIH to identify opportunities for collaboration with foreign science-funding agencies, the U.S. Department of State, U.S. technical agencies and international organizations. It also forms agreements with other nations to establish research collaborations and commitments for home country support.

DIVISION OF EPIDEMIOLOGY AND POPULATION STUDIES:

Predicting and analyzing disease trends and outbreaks

Fogarty's in-house scientists in the Division of Epidemiology and Population Studies conduct research on the epidemiology and mathematical modeling of infectious diseases. Primary concentrations include cross-national studies of mortality patterns with special emphasis on malnutrition and enteric diseases, influenza, vector-borne diseases, and vaccine-preventable diseases. Since 2000, these scientists have produced research used to guide domestic and international policy, as well as public health measures to control the spread of diseases.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GOAL 2

Stimulate innovation in the development and implementation of technologies and other locally relevant solutions to address global health problems

▶ *Strategic Priority*

Support the enhanced use of information and communication technologies to facilitate and improve health research education

Information is the most prized currency of our fast-paced, wired world. As bandwidth is expanding across Africa and elsewhere in the developing world, we must support online research collaborations, distance learning, science communication and knowledge exchange. All have the potential to revolutionize research and research training in low-resource settings. Fogarty will support efforts that explore how ICT can most effectively catalyze, facilitate and improve education and research training for health.

Eventually we hope to stimulate the development of "learning laboratories" in LMICs that are empowered to develop and evaluate different models of distance learning and other ICT strategies, as well as adapt open access platforms for the needs of research and research educational communities. Research will also be needed to identify new models for training in the use of ICT tools and strategies that can be implemented in low-resource settings, to foster the next generation of tech-savvy, multidisciplinary scientists. Fogarty's investments in this area will help ensure that the most recent scientific advances are accessible to students and scientists in LMICs.

Mark Siedner, M.D., M.P.H.

Fogarty Fellow, Uganda – 2011-2012

RESEARCH FOCUS:
Determinants of care and technological interventions

Post-training employment:
Clinical and research fellow in the Division of Infectious Diseases at Massachusetts General Hospital and Harvard Medical School

"My ability to participate in everything from research to clinical care in Mbarara, being mentored myself and mentoring others, has really set me on a trajectory to pursue my career goal of being an academic clinician focused on doing research in places like Uganda."

Over time, this capacity will enable professionals in LMIC institutions to assess the vast resources available and

what works best for their particular needs as they develop novel education tools. They will also have the capability to adapt their research and research training models to technologies as they evolve. Students and faculty will access, teach and share information in creative and transformative ways, enabling new approaches to collaborative learning and problem-solving in partnership with colleagues in the next room and across continents.

▶ *Strategic Priority*

Encourage innovation in the development and implementation of mobile and other technologies, systems, and policies to address global health problems

The use of mobile health technologies has expanded exponentially around the world. Of the 5.4 billion global mobile phone subscriptions, over 483 million are in low-income countries and 2.6 billion in lower-middle-income countries, with growth rates well over 35 percent in most developing regions (UNDP, Mobile Technologies and Development, 2012). Widespread access to cellphones has enabled health care providers to deliver information and services to larger and hard-to-reach populations. Scientists who utilize these tools can enhance the quality of their research and address certain research priorities. For example, mobile technologies can transform epidemiological and surveillance research and the ways data are collected and analyzed. Mobile devices can be used to capture, store, analyze, manage and present data. These devices can also be used to help create data platforms for new diagnostics and low-cost and real-time tools for tracking disease progression, movement, behavior, adherence to therapy, and environmental exposures.

Although much attention is focused on the promise of mobile technologies and health (mHealth), there is relatively little evidence linking improved health outcomes to mHealth interventions. Rigorous studies are required to assess the health impact of mobile technologies and to determine how they can be effectively scaled up in diverse, low-resource settings. The field is evolving so rapidly, that new, innovative and robust research methodologies will also be helpful to swiftly evaluate mHealth interventions. Finally, research is needed to determine how to best integrate the use of mobile technologies into larger research and health care systems. In sum, a foundation of evidence for mHealth interventions must be built to maximize their impact on health. This evidence base is not only critical for the development and implementation of effective mHealth interventions in LMICs, but research on this leapfrog technology can also be applied to health care in the U.S.

Global Health Research and Research Training eCapacity Initiative (eCapacity)

In 2013 Fogarty launched the eCapacity Initiative, with the aim of supporting innovative research education programs that provide researchers at LMIC institutions with the knowledge and skills necessary to incorporate ICT into global health research and research training. eCapacity grants are designed to leverage research and education efforts from current or prior Fogarty grants, connecting established research and/or research training programs, to ICT tools such as electronic training resources (distance learning platforms, open education collaborations or library collections) and ICT research tools (mobile technologies, modeling, bioinformatics, geospatial information systems). Through the initiative, participants will develop the skills and expertise needed to successfully integrate ICT into their activities and keep pace with rapidly evolving technologies.

The development of feasible, effective, and affordable solutions to health problems in culturally diverse, low-resource settings would benefit from more inclusive ways of conducting science. This paradigm engages researchers and other relevant experts from diverse disciplines together to think through all aspects of a particular health challenge and develop more holistic solutions that challenge the status quo. This type of innovation is relevant not only to the development and implementation of new or improved technologies, but also to processes, systems, and policies that impact the problem being addressed.

To encourage innovation in research and research training, Fogarty will continue to support interdisciplinary solutions-based approaches to global health challenges.

In addition, in partnership with other NIH Institutes and Centers, Fogarty will support training and encourage innovation in the development of low-cost technologies that are designed for, or can be adapted to, a wide range of low-resource settings. Such "frugal technologies"—cost-effective technologies that are developed specifically for local conditions—hold significant promise for improving population health and quality of life in LMICs. The Jaipur Foot, a rubber prosthetic for people who have lost their leg and foot below the knee; PATH's Uniject injection system, which allows once-only use of needles for injectable contraceptives; and the eRanger, a durable rural ambulance based around a motorbike and stretcher sidecar, are some examples of technologies that can be used, adapted and scaled up in diverse cultural and economic contexts.

Oluwatoyin F. Fafowora

Fogarty Fellow, Nigeria – 2008-2010

RESEARCH FOCUS:
Mutant genes in juvenile-onset glaucoma

Post-training employment:
Research fellow at UCLA's Jules Stein Eye Institute

Her Fogarty fellowship experience led to a change in career path from clinical work to research. "I'm in research now and I like it. I want to work to find new knowledge, to make a difference."

Innovation in Training, Strategies and Technologies for Global Health: FRAME Signature and FRAME Innovation

Today's complex public health challenges will benefit from the engagement of investigators from a wide variety of fields working together to find novel solutions. To date, few universities prepare students and faculty to respond to global health challenges through broad, interdisciplinary research. Two Fogarty programs—Framework Programs for Global Health (FRAME) Signature Innovation Initiative and FRAME Innovation—have supported multidisciplinary approaches in global health research training.

The Signature one-year pilot program supported the creation of infrastructure, resources, and opportunities for postdoctoral investigators in U.S. universities to carry out multidisciplinary team research in global health. For example, researchers from engineering, public health, and medicine applied point-of-care telemedicine units built with highly innovative lens-less, $2 microscopes attached to a cellphone to enable diagnosis of such infectious diseases as malaria and HIV in remote settings with no access to clinics. Another group worked collaboratively with a university in South Africa to develop an agent-based model to monitor the effects of interventions to improve water quality and reduce diarrheal disease in a poor rural province, drawing together participants from more than eight different schools within the partner universities. Other groups worked on innovations to disrupt the airborne transmission of TB, understand the relationship between women's empowerment and improved family health, increase retention in clinical trials, and explore drug resistance.

Building on FRAME Signature and Innovation awards, Fogarty is supporting U.S. and LMIC institutions to develop interdisciplinary, postdoctoral five-year research training programs in global health, directed at innovation in health products, processes, and policies. U.S. and LMIC teams identify critical health needs, and then do the research to develop and test concepts and solutions. At the outset, these projects will consider effectiveness, affordability, accessibility, ease of use or delivery, and scalability. This practical focus will increase the potential for translation of research findings into concrete and realizable health benefits.

Manisha Nair

Fogarty Scholar, India – 2009-2010

RESEARCH FOCUS:
Rate of coronary artery disease in South Asians

Post-training position:
Ph.D. student in Public Health
at the University of Oxford

"This experience completely changed the direction of my career… without going through such a learning experience I would not have had the confidence and knowledge in research that I have now to design any research project or epidemiological study."

GOAL 3

Support research and research training in implementation science

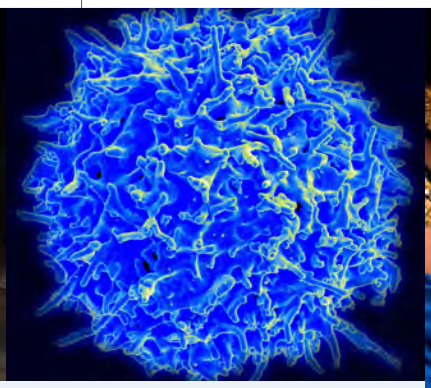
▶ *Strategic Priority*

Expand investment in research and research training in implementation science across programs

In the previous Strategic Plan, Fogarty highlighted research to ensure that proven health interventions can be effectively implemented and brought to scale. The gap between the promise of scientifically proven health innovations and their successful implementation in the real world persists in a wide variety of contexts, from prevention of mother-to-child transmission of HIV, to introduction of effective tobacco control strategies, to interventions to prevent adverse environmental exposures. Implementation science and researchers who are trained in related disciplines therefore remain a critical priority if the results of investments in research are to be fully realized. This research plays an important role in identifying barriers to, and enablers of, effective global health programming and policymaking, and leverages that knowledge to develop evidence-based innovations in effective delivery approaches. Given enduring gaps in translation of evidence into policy and programs, Fogarty will continue to support research and research training in implementation science across its programs, including in areas related to global tobacco control research, brain disorders, and HIV/AIDS. Fogarty will also continue to work with other NIH Institutes and Centers that are supporting research in this area, to help ensure that broader NIH efforts integrate a global perspective and provide a pathway for lessons learned abroad to be applied to public health challenges in the U.S.

Worldwide Discoveries Anywhere Can Help People Everywhere

DISEASE	DISCOVERY	IMPLICATIONS FOR GLOBAL HEALTH & THE AMERICAN PUBLIC
Breast Cancer	**Nigeria –** High fatality rates and ineffectiveness of treatment of African women with breast cancer, compared with Caucasian women in the United States, was linked to three genes.	In addition to several other factors such as access to care, genes play a key role in the poor prognosis of breast cancer and the lower success rates of treatment of the disease in African American women. Knowledge of genetic markers can facilitate personalization of treatment.
Hepatitis B	**Taiwan –** A 20-year study followed children vaccinated against Hepatitis B and found reduced rates of liver cancer.	Hepatitis B is a direct cause of cancer and vaccination in infancy can prevent liver cancer later in life.
Tuberculosis	**South Africa–**Scientists studied the optimal time to begin antiretroviral drug therapy (ART) for those infected with tuberculosis (TB). They found that ART drugs are safe and effective when given during TB treatment.	This discovery addressed widespread concerns about HIV and TB drug interactions. The World Health Organization and the government of South Africa changed their treatment guidelines to initiate ART in TB/HIV patients.
HIV	**Uganda –** Two randomized trials demonstrated that male circumcision reduced the risk of male HIV infection by about 60%. **Haiti –** Cellphones were distributed to HIV-positive patients in rural Haiti with no access to land line phones, in order to communicate with them regarding treatment and adherence.	Circumcision is recommended worldwide as an HIV prevention strategy and programs to circumcise both adult men and infants are now ongoing. Mobile technologies proved effective in promoting increased treatment and adherence to therapy. This program has been replicated in rural Virginia.
Burkitt lymphoma	**Uganda –** Use of one of three chemotherapy drugs–CTX, MTX, or VCR–cured or achieved partial response in infected patients.	Building on this initial use of chemotherapy to treat patients with Burkitt lymphoma, simpler chemotherapy regimens have been implemented in sub-Saharan Africa. Scientists have gone on to conduct studies that led to today's combination chemotherapy regimes with a better understanding of dose-response relationships.
Influenza	**Worldwide –** Annual information is collected on flu incidence, flu strains and predisposing conditions to prepare new vaccines for global and domestic use.	Next generation flu vaccines given in the United States and around the world are produced in response to the international flu data collected.



Strategic Priority

Catalyze interaction between researchers, policymakers and program implementers to promote uptake of evidence into global health policy and practice

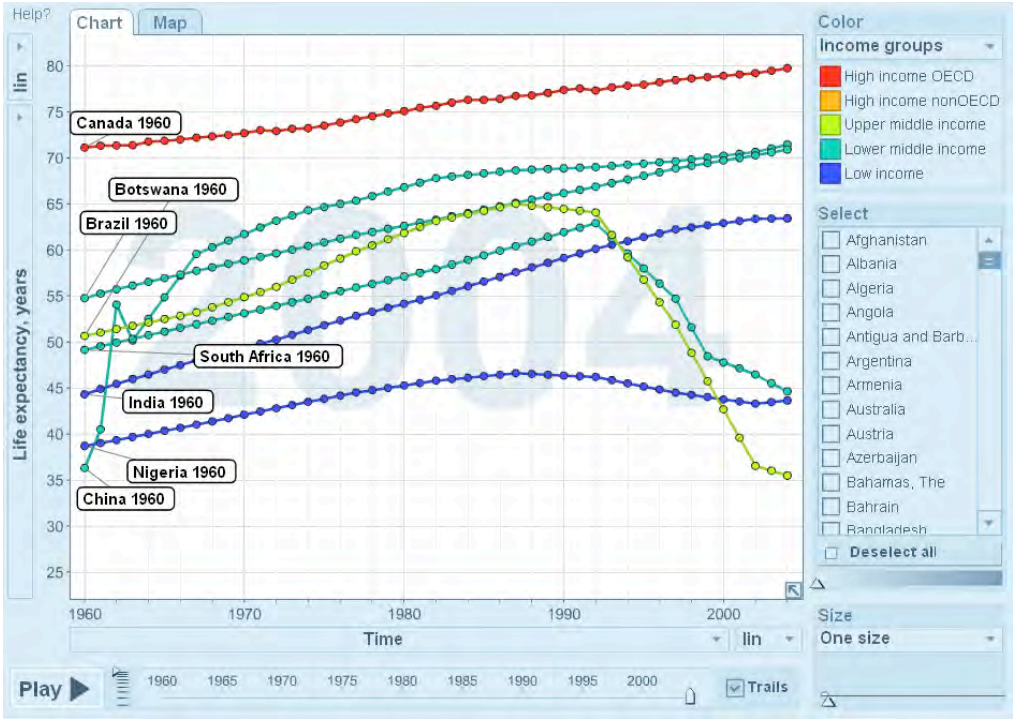
Support of implementation research alone will have limited impact unless it is accompanied by efforts that facilitate utilization of scientific evidence by health program implementers and policymakers. Knowledge translation and optimal uptake of evidence-based interventions requires deliberate and strategic efforts to facilitate collaboration, communication, and relationship-building between the scientific community and implementers and decision-makers. Therefore, building on its investments in implementation science research and training, Fogarty will explore new strategies to catalyze effective interactions between researchers and program implementers and policymakers in an effort to maximize public health outcomes and the return on research investments. Enhanced communication and collaboration between these communities can help to facilitate better translation of evidence into health policies and programs, while simultaneously helping to ensure that research is country-driven and responsive to the local context.

GOAL 4

Advance research on prevention and control of the dual burden of communicable and non-communicable diseases and disabilities

Dr. Margaret Chan, Director General of the World Health Organization, noted that the global epidemic of chronic, non-communicable diseases (NCDs) is a "slow-motion catastrophe." Although most NCDs develop gradually, the risk factors that underlie NCDs are spreading rapidly in all world regions. According to the Global Burden of Disease Study 2010, 34.5 million or 65.5 percent of total deaths at all ages were due to chronic diseases. Nearly 80 percent of chronic disease deaths now occur in LMICs, with close to one-third of these deaths affecting people under the age of 60. As we face a dual epidemic of NCDs and infectious diseases in many LMIC regions, NCD prevention research and collaboration between the infectious disease and NCD scientific communities will be critical to reversing these trends and improving health.

Gapminder Life Expectancy Chart



Source: Gapminder Foundation, 2006

Training the Next Generation of Scientists in Chronic, Non-communicable Diseases

During a Fogarty International Clinical Research Fellowship in Kenya in 2009-2010, Dr. Gerald Bloomfield observed an epidemic of diabetes, heart failure and high blood pressure. He responded by creating a series of lectures that enhanced the capacity of local medical students, residents and technicians. As an Assistant Professor in the Department of Medicine (Cardiology) and the Duke Global Health Institute, Dr. Bloomfield currently researches the epidemiology of heart failure and cardiovascular risk factors in sub-Saharan Africa. A K01 award from Fogarty now supports Dr. Bloomfield's research in cardiology and pulmonology. He also works closely with the National Heart, Lung and Blood Institute's Cardiovascular and Pulmonary Disease Center of Excellence at Moi University where he spends six months a year studying heart failure epidemiology, the cardiovascular effects of indoor air pollution and cardiovascular risk factors among HIV-positive patients. By demonstrating the true burden of chronic, non-communicable disease through epidemiology, Dr. Bloomfield hopes to use research evidence to influence policy change in LMICs.

▶ *Strategic Priority*

Support research and research training in clinical, behavioral and population sciences

Fogarty is uniquely poised to catalyze prevention research and support research training to understand the determinants, risk factors, disease prevention strategies, and potential interventions for a wide range of NCDs. Common risk factors have resulted in an escalating burden of metabolic disorders, with epidemics of under- and over-nutrition, diabetes, and obesity. The ecosystem in which risk factors—such as aging, rapid urbanization, lifestyle changes, early life exposures, nutrition, genetic predispositions, and access to care—interact is complex. How this contributes to these epidemics is critical to the development of interventions that can prevent NCDs from escalating, and provide therapies for treatment. Fogarty will stimulate research and support training in this space, encouraging new approaches to problem-solving and research that addresses multiple disease burdens simultaneously.

Confronting the global NCD crisis will require a highly skilled and nimble research workforce that is poised to examine a wide range of risk factors and their interactions. The development of effective and locally appropriate interventions will require that these scientists be trained to think and work across multiple disciplines and across diverse international settings in response to local needs and research priorities. Given the burden of NCDs in the U.S. and other high-income countries as well as LMICs, this research is ripe for knowledge exchange, collaboration and team science. Fogarty is well-positioned to invigorate this workforce both in the U.S. and

abroad, and in doing so, engage other partners to support training of the next generation of scientific leaders in global NCDs.

▶ *Strategic Priority*

Identify ways to leverage investments in communicable diseases, including HIV, to better address the dual burden of disease

Fogarty's long-standing investments in research and training on HIV/AIDS and other communicable diseases provide a platform to address other global challenges. Fogarty will support an approach that leverages the human capital and research platforms built to address HIV/AIDS and other infectious diseases to now tackle the rising burden of NCDs and address the interrelationships between infectious diseases and NCDs. For example, as access to antiretroviral therapy has increased significantly and HIV-infected individuals are living longer, a new research agenda has emerged around HIV and NCD co-morbidities. This includes epidemiological studies regarding the incidence and prevalence of co-morbidities, the potential effects of antiretroviral therapy (ART) on pathogenesis, cost-effective ways to integrate HIV and NCD services that improve health outcomes, and prevention of NCDs in the HIV-positive population. Other examples of relevant research areas include chronic infectious diseases with NCD sequelae, infectious origins of NCDs, disease management strategies that impact multiple conditions, and the development of mobile and other technologies that integrate health data across conditions to improve patient care.

Over the next several years, Fogarty will support efforts to build on existing cohorts, data collection and analytic capabilities, laboratory capacity and human research capacity to move the prevention science agenda forward and respond to evolving public health challenges.

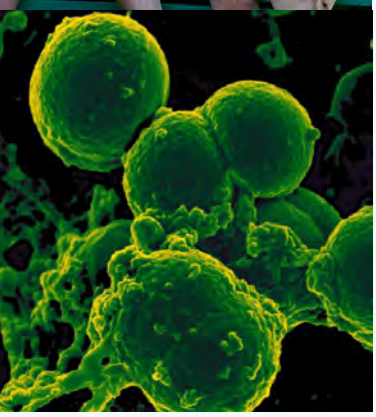
Krista Pfaendler, M.D.

Fogarty Scholar, Zambia
2006-2007

RESEARCH FOCUS:
Cervical cancer screening in Zambia

Post-training employment:
Resident in obstetrics and gynecology

The program cemented her decision to apply for obstetrics and gynecology residency, sparked interest in gynecologic oncology, and created relationships that allow continued research and collaboration during her residency.



Global Burden of Disease Study 2010:
Change in disability-adjusted life years, by cause, rank

1990	2010
1 Lower respiratory infections	1 Ischemic heart disease
2 Diarrheal diseases	2 Lower respiratory infections
3 Preterm birth complications	3 Stroke
4 Ischemic heart disease	4 Diarrheal diseases
5 Stroke	5 HIV/AIDS
6 Chronic obstructive pulmonary disease	6 Lower back pain
7 Malaria	7 Malaria
8 Tuberculosis	8 Preterm birth complications
9 Protein-energy malnutrition	9 Chronic obstructive pulmonary disease
10 Neonatal encephalopathy	10 Road injury
11 Lower back pain	11 Major depressive disorder
12 Road injury	12 Neonatal encephalopathy
13 Congenital anomalies	13 Tuberculosis
14 Iron-deficiency anemia	14 Diabetes
15 Major depressive disorder	15 Iron-deficiency anemia
16 Measles	16 Neonatal sepsis
17 Neonatal sepsis	17 Congenital anomalies
18 Meningitis	18 Self-harm
19 Self-harm	19 Falls
20 Drowning	20 Protein-energy malnutrition

Communicable, maternal, neonatal, and nutritional disorders

Non-communicable diseases

Injuries

AIDS International Training & Research Program (AITRP)
Contributing to an AIDS-Free Generation

AITRP PI
1997-2004

Salim Abdool Karim
Director CAPRISA, South Africa & President of the South African Medical Research Council

Dr. Abdool Karim has played a major role in Columbia University's 20-year AITRP program, which has trained and mentored numerous South African researchers. The program is linked to significant scientific advances, including effective management strategies for patients co-infected with HIV and TB and the use of microbicides as a tool for preventing HIV infection in women.

AITRP Trainee 2000
ICOHRTA AIDS/TB PI
2002-Present

Zunyou Wu
Director, National Center for AIDS/STD Control & Prevention, Chinese CDC, China

Dr. Wu conducted a series of projects that led to the development of national guidelines for HIV prevention among sex workers and the national condom promotion program. He also developed the methadone maintenance program for injecting drug users, which has now expanded to most provinces in China.

AITRP Trainee
1991-1994

Ruth Nduati
Faculty of Medicine, College of Health Sciences, University of Nairobi

Dr. Ruth Nduati is internationally recognized for her research involving mother-to-child HIV transmission. She received her master's through AITRP, writing her thesis on the correlates of HIV-1 in breastmilk. Dr. Nduati provides technical expertise to the Kenyan Ministry of Health and WHO, and is currently working on increasing the retention rate of faculty at the University of Nairobi in collaboration with the MEPI program.

Scientific advances that include contributions from former AITRP trainees

Treatment as Prevention

A multi-country study demonstrated that patients who took antiretroviral drugs soon after diagnosis were 96 percent less likely to infect their HIV-negative heterosexual partner than if they waited until the virus climbed to a specific concentration in their blood. As a result, the WHO updated its guidelines on when to begin antiretroviral therapy. The finding was named Breakthrough of the Year by *Science* magazine in 2012.

Circumcision

A study in Uganda's Rakai district confirmed that male circumcision reduces HIV incidence. This discovery prompted the WHO to recommend circumcision as a way to help curb HIV infection in high-risk populations.

Tuberculosis Co-infection

A house-to-house study in rural Kenya used cough monitors to determine the prevalence of HIV and TB coexistence and the severity of multidrug resistance in rural Kenya. The technique has now been replicated in other countries.

Discordant Couples

A large survey in Uganda revealed that HIV prevalence had leveled off, so researchers investigated the predominant way HIV was being transmitted. They found that transmission was no longer via casual relationships but rather occurred in established relationships. Their findings led to changes in prevention strategies in Uganda and other countries.

Antiretroviral Adherence

With the advent of antiretroviral drugs, some questioned whether patients in low-resource, low-education settings could follow the regimen of multiple drugs to be taken at precise times each day. AITRP trainees in Port-au-Prince, Haiti, helped conduct a study showing that patients in such settings were able to adhere to the drug regimen as effectively as patients in New York City.

Improving Understanding of Environmental and Occupational Health Hazards Worldwide

In low- and middle-income countries (LMICs), exposures to environmental and occupational hazards such as contaminated air, water, soil, and food contribute to nearly a quarter of all deaths and illnesses. In order to build LMIC capacity to study the links between environmental and occupational risk factors and disease, Fogarty's International Training and Research In Environmental and Occupational Health (ITREOH) program funded 22 U.S. institutions and over 75 LMIC institutions to train LMIC scientists, clinicians, epidemiologists, toxicologists, engineers, industrial hygienists, chemists, and allied health workers in 40 countries in both general environmental health and occupational health. This program produced 460 publications, approximately 300 of which are in PubMed.

Among other important exposures, ITREOH projects contributed to scientific understanding of the link between cognitive function and toxin (arsenic and manganese) exposures in childhood.

In Mexico, researchers found that arsenic exposure and chronic malnutrition combined to negatively affect verbal ability and long-term memory. In both Brazil and Bangladesh manganese exposure was linked to negative outcome—in Brazil to lower verbal and IQ abilities, and in Bangladesh to problematic classroom behavior. These findings are important for future efforts to protect children's health.

Building on these investments, the ITREOH program has evolved into the Global Environmental and Occupational Health (GEOHealth) Hub Program, launched in partnership with the National Institute of Environmental Health Sciences (NIEHS) and the CDC's National Institute for Occupational Safety and Health (NIOSH). GEOHealth will support a network of collaborative research training hubs in LMICs that will, in close partnership with U.S. academic institutions, focus on collaborative research, data management, training, curriculum development and policy support regarding high-priority

environmental and occupational health research in their regions. The hubs will build a critical mass of well-trained scientists in LMICs with support and recognition from national governments, and provide world-class platforms for collaborative population-based environmental health research of global relevance. Using the core sciences of environmental monitoring, exposure science, epidemiology, genetics, biostatistics, information and communications technology, and data management, the GEOHealth hubs will become 21st century knowledge synthesis networks in the developing world.

GOAL 5

Build and strengthen partnerships to advance global health research and research capacity

Fogarty investments in global health research and capacity building have always been based upon creative and sustainable partnerships. Long-term collaborations between scientists in LMICs and the U.S. have formed the backbone of Fogarty's programmatic investments. Beyond research institutions, the world of global health now includes a wide range of stakeholders, presenting exciting new opportunities for innovative partnerships. NIH Institutes and Centers, other U.S. government agencies, other nations, foundations, and industry all bring unique assets to our common endeavor of improving health around the world. Partnerships both within and outside the NIH can marshal respective strengths and resources to increase returns on investment and achieve greater global public health gains.

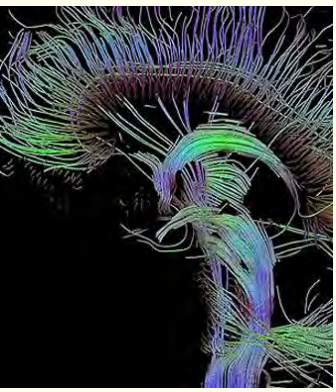
Strategic partnerships will continue to be at the core of how Fogarty fulfills its mission. The Center will work closely with its partners to promote greater scientific collaboration, build bridges between scientists, institutions and countries, and capitalize on the rising tide of interest in advancing global health.

Strategic Priority

Engage and support the NIH Institutes and Centers to advance their research agendas for global health

Since its establishment, Fogarty has served as a focal point for global health at the NIH by informing, initiating, and managing global health activities in collaboration with other NIH Institutes and Centers. The last several years have seen greater engagement in global health research and capacity building across the NIH. This trend presents exciting opportunities to catalyze new activities that address emerging global health priorities and to forge new scientific relationships and agreements with other countries. Fogarty research training programs also provide platforms for other Institutes and Centers to invest in the next generation of U.S. and foreign researchers in targeted areas of research interest. Fogarty will also work with NIH partners to design research and research training programs that cut across multiple NIH Institute and Center

Brain Disorders in the Developing World: Research Across the Lifespan (BRAIN)



Despite the significant burden of disease they represent, nervous system disorders and conditions have been largely absent from the global health agenda. In LMICs, these disorders are predicted to have an increasing impact, so research on the etiology, prevention and treatment of individual conditions and disorders is needed, along with implementation research on how to best deliver affordable and effective care for conditions such as epilepsy. Fogarty's BRAIN program supports cutting-edge research in LMICs on nervous system development, function, and impairment throughout life—research that could lead to new diagnostics, prevention, and treatment strategies.

Reducing the Stigma of Epilepsy

Former Fogarty Fellow and current Fogarty and National Institute of Neurological Disorders and Stroke (NINDS) grantee Dr. Gretchen Birbeck has conducted critical research on epilepsy in Africa, where it is the most common chronic neurologic disorder. However the stigma associated with epilepsy prevents many from seeking affordable care. As a Fellow, Dr. Birbeck conducted quantitative and qualitative studies in Zambia, aimed at understanding all facets of the epilepsy burden and developing interventions that can reduce the stigma as well as the morbidity and mortality from epilepsy. She currently leads an R01 grant that builds on her previous research to develop, implement, and evaluate interventions that will reduce seizure-related morbidity and mortality while addressing epilepsy stigma and promoting the socioeconomic status of those living with epilepsy. As an associate professor at Michigan State University (MSU), the Director of MSU's International Neurologic & Psychiatric Epidemiology Program, honorary lecturer at both the University of Zambia and the University of KwaZulu Natal, and the Director of Chikankata Health Services in Zambia, Dr. Birbeck is pioneering efforts to increase understanding of and local capacity to address epilepsy in resource-poor environments.

mandates. Strong inter-Institute and Center collaboration strengthens the impact of Fogarty investments and harnesses the unique scientific expertise that resides in other parts of the NIH. Fogarty's deep regional expertise will continue to serve as a unique resource for NIH, and for individual foreign scientists, institutions, and countries seeking effective mechanisms to enable collaboration.Through these relationships, Fogarty is able to advance global health research and research training goals shared by NIH partners.

▶ *Strategic Priority*

Forge partnerships at home and abroad to leverage complementary interests and strengths

Today's diverse landscape of public and private entities engaged in global health presents exciting opportunities to strengthen and build new partnerships that further the global health research agenda. Fogarty will continue to work closely with existing and new partners to address mutual interests and harness respective

The Interactions of Malnutrition & Enteric Infections: Consequences for Child Health and Development (MAL-ED)

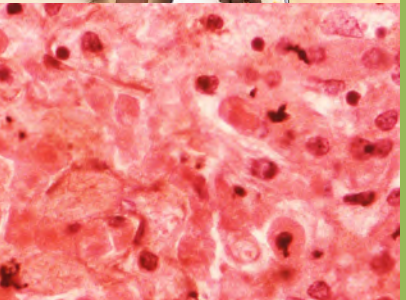
In LMICs, an estimated one in every five children is malnourished. Poor nutrition is linked to over half of child deaths around the globe, with malnutrition increasingly shown to be a critical cause of cognitive and physical defects, low birth weight, and death. Alongside the morbidity and mortality linked to poor nutrition and malnourishment, children in LMICs are exposed to an enormous burden of enteric infectious diseases that contribute to malnourishment, decrease gut integrity, and weaken immune systems.

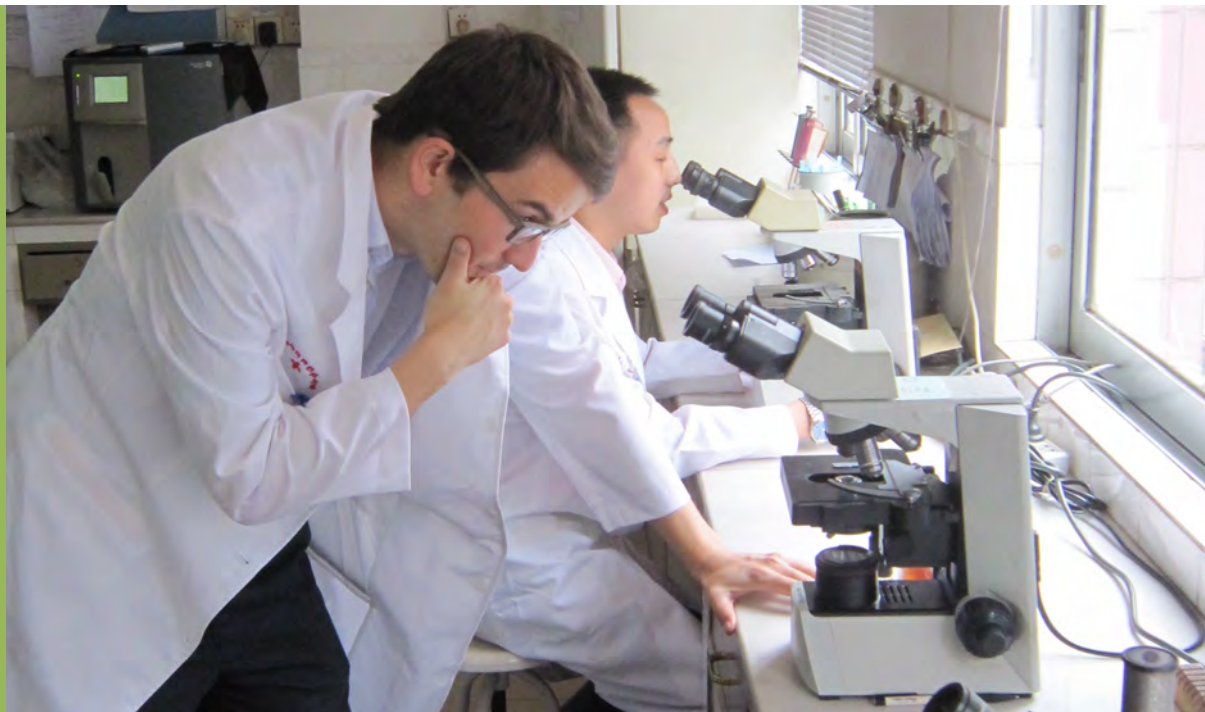
With support from the Bill and Melinda Gates Foundation and in partnership with the Foundation for NIH, Fogarty manages the Global Network for the Study of Malnutrition and Enteric Disease (MAL-ED) program—a five-year, multisite project that investigates the linkages between malnutrition and intestinal infections, and their effects on children in LMICs. From MAL-ED sites in Brazil, Peru, South Africa, Tanzania, India, Pakistan, Bangladesh and Nepal, MAL-ED investigators evaluate the etiology, risk factors, and interactions of enteric infections and malnutrition for child health, with the goal of identifying better and more cost-effective interventions that will reduce preventable child death and illness worldwide. Genome-wide studies are also being conducted to identify candidate human genes associated with under-nutrition and growth impairment.

strengths in support of critical global health research and research training priorities.

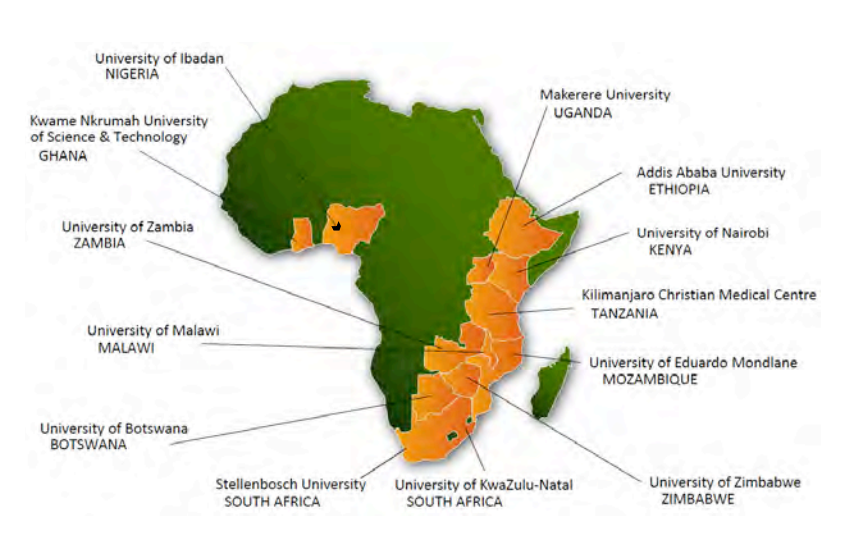
Several other U.S. government agencies have expanded their engagement in global health in recent years, and Fogarty is poised to capitalize on those investments to confront evolving global health challenges. Partnerships with other U.S. government agencies have resulted in ground-breaking models for capacity building and have supported high-impact global health research. The Office of the Global AIDS Coordinator (OGAC) remains a key Fogarty partner. The network of research institutions supported by the Medical Education Partnership Initiative—a landmark partnership between OGAC, the Health Resources and Services Administration and NIH—will continue to be an innovative platform for strengthening clinical research capacity in sub-Saharan Africa.

With the U.S. Department of State, Fogarty supports research at Karakoram International University in Pakistan focused on water, sanitation, health and hygiene interventions in northern Pakistan, which is intended to inform policy and program decision making about long-term disease-control investments. The U.S. Department of Agriculture and the Department of Homeland Security also remain strong collaborators, and Fogarty will continue to





TRANSFORMING MEDICAL EDUCATION IN AFRICA:
THE MEDICAL EDUCATION PARTNERSHIP INITIATIVE (MEPI)



MEPI is an innovative cross-U.S. government initiative funded primarily by the Office of the Global AIDS Coordinator (OGAC), and jointly administered by the Health Resources and Services Administration (HRSA) and Fogarty, in collaboration with 18 NIH Institutes and Centers and other USG entities.

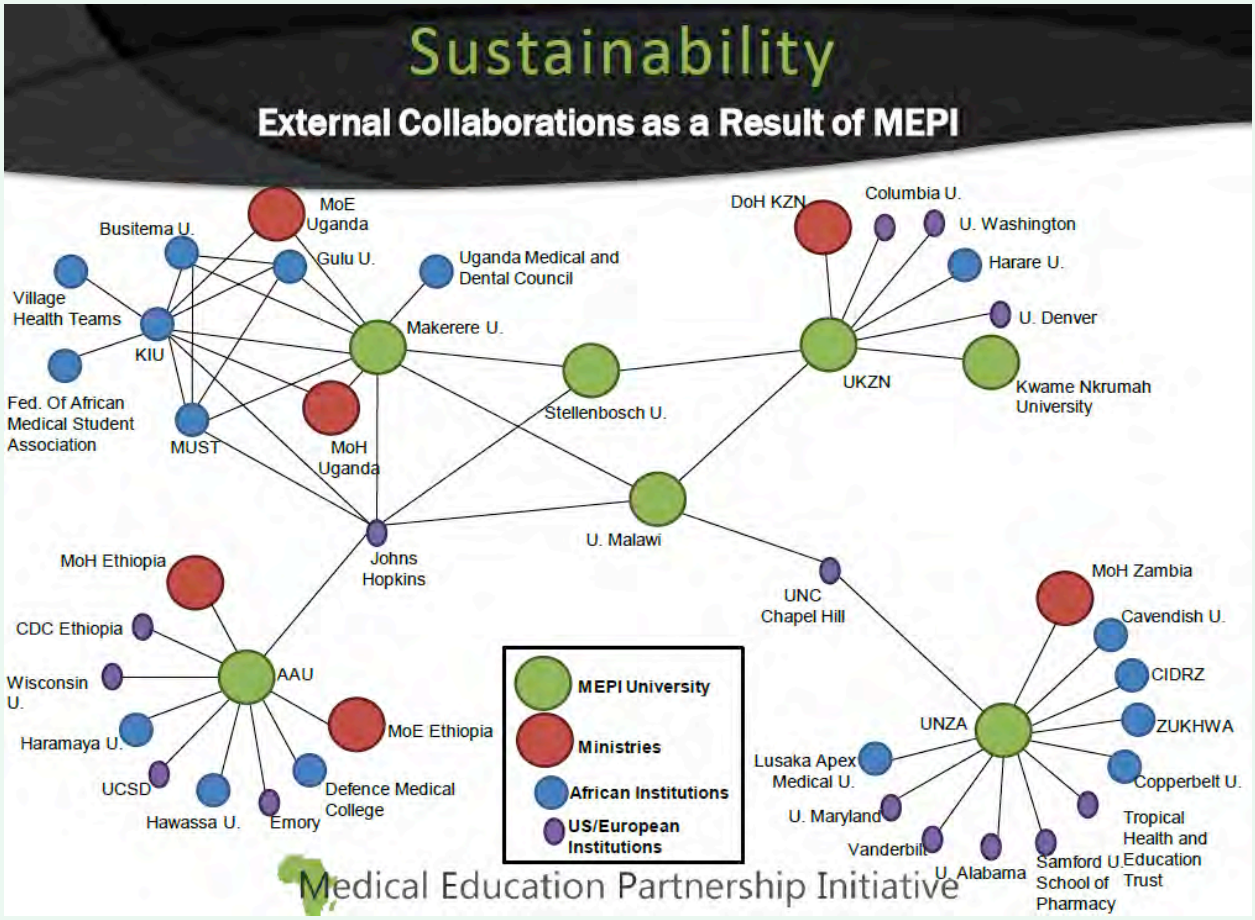
MEPI is transforming medical education and research training for medical students in 12 African countries through direct support to African institutions to develop or expand and enhance models of medical education. The 13 universities in the MEPI network and over 40 partners are recruiting and retaining well-qualified faculty, employing state-of-the-art teaching tools, developing regional training centers and upgrading technology to enable distance learning and resource sharing among institutions.

To complement these programmatic awards, NIH Institutes are funding linked awards that support critical research training needs. In Uganda, for example, the National Heart, Lung and Blood Institute is supporting a program at Makerere University College of Health Sciences and Mbarara University of Science and Technology to train medical students in cardiovascular disease (CVD) risk assessment and primary care. The program offers master's degree programs for residents and short-term fellowships and Ph.D. training for young faculty interested in developing clinical and research careers in CVD. In Kenya, a MEPI linked award is supporting the establishment of a Collaborative Center of Excellence in Maternal, Newborn, & Child Health at the University of Nairobi. This center will build multidisciplinary implementation science research capacity that will enhance the ability to link research to practice in the critical areas of maternal, newborn and child health.

MEPI is increasing the quality, quantity, and retention of medical faculty and physicians with research skills, and building the relationships with the public sector partners that promote sustainable research capacity. MEPI-supported universities in sub-Saharan Africa are emerging as regional training centers where partner institutions across the continent pool areas of expertise, share teaching tools, and ensure that all students receive the highest-quality instruction from the best qualified faculty and researchers. By encouraging local ownership and allowing each country to adapt the program to suit its unique resources and health needs, MEPI is making a sustainable difference.

"MEPI is fostering indigenous capacity to strengthen health systems in a sustainable manner . . . If we are to make a truly lasting difference in our health and development programs, we must support this kind of work."

– Ambassador Eric Goosby, Former U.S. Global AIDS Coordinator



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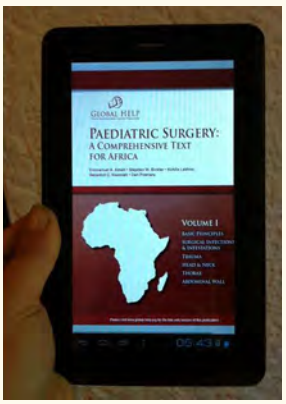

MEPI funding has helped Africa's medical schools move from hard copies of textbooks, which are expensive and quickly out-of-date, to tablets that provide access to the latest information.

work with the U.S. Agency for International Development and the Centers for Disease Control and Prevention to identify common areas of interest and ways in which to leverage respective and unique strengths to address common global health goals.

Many emerging economies especially Brazil, Russia, India, China and South Africa (BRICS), see the value of investing in research. Their major research institutions are now attracting scientists from around the world. These investments have contributed to global health training, building research infrastructure, ensuring access to treatment, and developing new interventions. This increased commitment and capacity presents opportunities to develop new models of research partnerships that advance scientific discoveries–models in which countries are investing their own resources, working together, and sharing expertise to stimulate innovation.

Fogarty has played a significant role in facilitating new agreements between NIH Institutes and the Indian government related to diabetes, neuroscience and the development of low-cost technologies. In each case, the respective partners are sharing knowledge and leveraging resources to achieve common goals.

Other governments, foundations, the World Bank, scientific professional societies and industry all bring unique expertise and resources to the global health agenda. Fogarty will continue to explore opportunities for new partnerships that can increase the impact of respective investments, incentivize innovation, support training, and provide research infrastructure for tomorrow's global health research workforce.

Partnerships with Emerging Economies

Over the last few years, the emerging economies of Brazil, Russia, India China and South Africa (BRICS) have built highly capable biomedical enterprises. NIH and the BRICS countries have begun to establish new and innovative partnerships, funding individual teams of experts who work together and share expertise to speed discovery. The NIH is partnering with Brazil's Council for Technological Development (CNPq) to train 75,000 Brazilians in science and technology over the next four years. CNPq will fund half of the stipends for all intramural postdocs, with about 80 postdocs coming to the NIH campus for research training and collaboration. In India, Fogarty is facilitating nine partnerships between Indian institutions and organizations and different NIH ICs, in specific areas of mutual interest, such as development of low-cost medical technologies. And in China, under the new U.S.-China Program for Biomedical Research Cooperation, each country will support its own scientific teams to conduct over 30 joint research projects, such as comparative population studies, to help us better understand how to prevent disease and investigations of traditional medicines that target cancer.

▶ *Strategic Priority*

Convene global experts to address priority research questions and catalyze new areas of science

Fogarty is always looking ahead to emerging challenges and new research opportunities, and will continue to bring the best scientific minds from the NIH and around the world together to identify significant trends, evidence gaps, and research priorities in key areas. In this role, Fogarty draws attention to emerging research agendas and unmet needs, stimulating new scientific activity. Through bringing diverse stakeholders together—including scientists, other U.S. and foreign government agencies, non-governmental organizations, and the private sector—Fogarty provides a platform for international scientific dialogue and fosters an environment that encourages new partnerships and collaboration. By including the perspectives of scientists and other relevant stakeholders from LMICs, Fogarty provides a unique forum for NIH and LMIC scientific leaders to inform each other's activities and to collaboratively chart out scientific directions regarding global health issues, ranging from global tobacco control, to the health impacts of urbanization, to the prevention of childhood obesity in the U.S. and abroad.

Center for Global Health Studies

A New Tool for Innovation and Scholarship in Global Health Science and Policy

In 2012, Fogarty launched the Center for Global Health Studies (CGHS) as a physical and virtual space to support innovation and multidisciplinary scholarship and training to address pressing global health problems.

CGHS PROJECTS:

- Cut across the missions of multiple NIH Institutes and Centers and involve at least one NIH IC partner
- Engage collaborators from different sectors with unique expertise and resources
- Foster multidisciplinary and/or multi-sector approaches
- Produce concrete, implementable deliverables and recommendations for action
- Engage LMIC scientists, program implementers and/or policymakers

AREAS OF FOCUS:

Implementation science:

Developing the new approaches and skills needed to better translate scientific evidence into health policy and practice

For example, the prevention of mother-to-child transmission (PMTCT) of HIV is one of the most cost-effective methods to prevent new cases of HIV. From 2013–2015, CGHS will bring together a network of PMTCT researchers and implementers to enable research to be better informed by the implementer community and encourage policies and programs based on robust scientific evidence.

Scientific roadmaps

Development of research agendas that tackle specific global health problems.

For example, HIV is no longer a death sentence and as more people live longer, the disease treatment can lead to other substantial problems. In 2013, CGHS brought together small groups of U.S. and LMIC scientific experts to identify key research and capacity building priorities to confront the growing burden of HIV and NCD co-morbidities in LMICs. A resulting publication in 2014 is intended to stimulate new research and scientific collaborations, and creative partnerships among a broad range of sectors and stakeholders.

Scientific exchange and training

Opportunities for U.S. and foreign investigators, including mentored research projects, workshops, or short-term training institutes

For example, household air pollution (HAP) affects more than 3 billion people in the world and is estimated to cause greater than 2 million deaths. In 2012, CGHS held a 3-day training course for scientists from the U.S. and low- and middle-income countries interested in developing research projects on the health effects of HAP from traditional versus improved cookstoves. The training institute helped prepare a new cadre of researchers to better define and understand the health risks associated with HAP, the epidemiological principles that inform robust and appropriate research study designs, the critical role of the social, behavioral and cultural factors influencing stove adoption and the evolving technologies for improved cookstoves, new fuels, exposure monitoring, and biomarker development.


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CONCLUSION

The world is becoming smaller as it becomes more interconnected, and national boundaries are now much less relevant to the conduct of scientific research. This makes Fogarty's mission of catalyzing and supporting research and research training partnerships across countries, regions and continents all the more critical. Fogarty investments have made significant contributions to global health, harnessing the capabilities of the United States and the NIH as leaders of biomedical research, helping to extend the frontiers of science and accelerate discovery. Above all, Fogarty has invested and will continue to invest in people—the most important resource in global health research, serving on the front lines in our fight against disease and disability that affect populations in the U.S. and across the globe.

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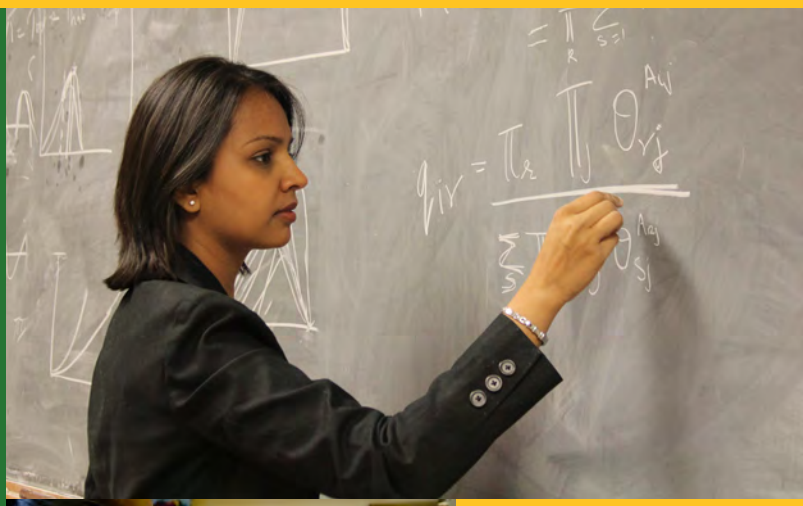

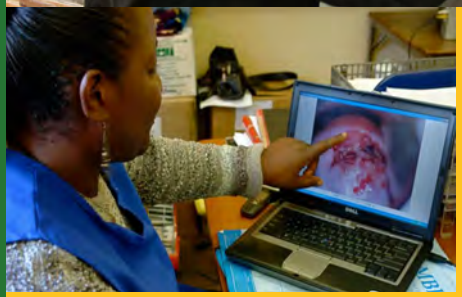

The John E. Fogarty International Center

31 Center Drive
MSC 2220
Bethesda, Maryland 20892
301-496-2075
www.fic.nih.gov

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