



NIH partners with PEPFAR to strengthen medical education in Africa

The NIH has announced a new initiative to strengthen medical education in sub-Saharan Africa, in collaboration with the President's Emergency Plan for AIDS Relief, known as PEPFAR. This program supports PEPFAR's goal to increase the number of new health care workers by 140,000. It will also strengthen host-country medical education systems and enhance clinical and research capacity in Africa.

The Medical Education Partnership Initiative will award African institutions with as many as nine grants focused on PEPFAR priority areas. In addition, six linked awards will support work in non-communicable diseases and priority health areas related to, and beyond, HIV/AIDS. The program will also support one coordinating center.

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Photo by David Snyder, courtesy of Photoshare

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H1N1 had significant impact in life years lost

Some thought reaction to the 2009 H1N1 threat was overblown by the media, pharmaceutical companies and public health organizations. But due to the disproportionate number of children and young adults that died as a result of this strain of flu, some researchers have determined that the H1N1 impact was greater than perceived. They propose that life years lost is a more accurate measure of the impact of a public health crisis than mortality numbers without context.

With three colleagues, Fogarty scientists Dr. Cecile Viboud and Dr. Mark Miller analyzed age-group mortality data applied to the estimated deaths from this pandemic and they published their conclusions in *PLoS Currents: Influenza*. The findings are conservative because more

waves of this flu are expected, along with more deaths, in 2010 and possibly beyond.

According to the scientists, the true toll of this pandemic is between 334,000 and 1,973,000 years of life lost, putting its impact somewhere between a tough seasonal flu epidemic and the pandemic of 1968-69 that was called the 'Hong Kong flu.'

Concerns that the true severity of the 2009 influenza pandemic was underestimated led to this project. The World Health Organization in particular was criticized for responding too forcefully, issuing overzealous vaccine recommendations that put people at risk of unknown side-

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FOCUS



Fogarty trainees are making a difference:

- Preventing mother-to-child HIV transmission in Malawi
- Working for clean water in Argentina
- Improving mental health care in Indonesia
- Combating sleeping sickness in Kenya

Read more on pages 6 - 9

Collins champions building research capacity

Photo by Terry Hill/Natl Press Club



Dr. Francis Collins

NIH Director Dr. Francis Collins recently stressed the importance of building capacity in the low- and middle-income countries where the NIH funds research, especially in sub-Saharan Africa. At a speech at the National Press Club he said, “We should not just provide tools and hand them over.”

He believes that global health research has more potential now than it’s ever had in all of history, saying, “We’ve learned a lot about the pathogens that cause diseases in low-income countries and we have a chance to develop new strategies, new drugs, new vaccines and new diagnostics.”

Funding can’t all go to HIV/AIDS, TB and malaria, he warned, but dollars and effort must extend to neglected tropical diseases and non-communicable diseases like diabetes and hypertension, the fastest growing causes of morbidity and mortality in the developing world. “We’ve done relatively little to prepare for that,” he said.

NIH invests approximately \$600 million a year in global health projects and Collins would like to see that figure increase. As a country with resources, he says, the U.S. has a responsibility to reach out with research dollars to improve people’s lives around the world. “This type of outreach is a good form of diplomacy—soft power or smart power,” he concluded.

Wald urges focus on chronic disease prevention

Photo by Jeff Gray



Sir Nicholas Wald

More attention should be devoted to preventing chronic diseases and less to measuring them, according to British scientist Sir Nicholas Wald. Best known for conceiving the polypill, an innovative and economical treatment that combines statins, heart disease and high blood pressure medications, Wald recently addressed a gathering of NIH researchers.

“Prevention is better than measurement; we are obsessed with measurement,” he said. “It’s better to lower blood pressure in all and measure it in some, rather than measure it in all and lower it in some.”

Widely considered one of the world’s leading epidemiologists and neonatal health experts, Wald’s research on the polypill was hailed as the most important work published in 50

years by the *British Medical Journal*.

Wald and his colleagues have since been able to reduce blood pressure, LDL cholesterol and the risk of heart disease in polypill trials. Though there have been financial obstacles, two versions of the pill have been manufactured by the drug company Cipla: a pill designed for primary prevention and a secondary prevention pill containing aspirin.

The Disease Control Priorities Project identified the polypill concept as one of 10 “best buys” for advancing global health in low-resource countries. Wald said that preventive measures such as the polypill are even more important now that Western-style diets are contributing to cardiovascular disease in low- and middle-income countries.

Wald dismissed concerns that large-scale implementation of the polypill would “medicalize” people, instead likening it to birth control for women or malaria prophylaxis, neither of which requires the user to become a patient.

NIH partners with PEPFAR...

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“As we transition from an emergency response to a more sustainable approach, we are supporting partner countries in leading the response to their epidemics,” said Ambassador Eric Goosby, U.S. Global AIDS Coordinator. “Shortages of trained doctors are a key constraint, and we are proud to support partner nations in expanding the number and quality of clinicians available and facilitate strong faculties of medicine so they can meet their people’s needs over the long term.”

This program is a joint effort of the Office of the U.S. Global AIDS Coordinator, the Health Resources and Services

Administration, the Centers for Disease Control and Prevention, the DoD and 19 NIH components. The awards will be administered by Fogarty and HRSA.

“This program will not only strengthen medical education to produce much needed caregivers but will also generate well-trained researchers who are able to apply a multidisciplinary and implementation focused approach to locally relevant scientific questions,” said NIH Director Dr. Francis Collins, who committed support from the NIH Common Fund.

For more info go to <http://bit.ly/aQnc4z>

Global health data guru Dr. Hans Rosling urges researchers to be more inclusive

By Ann Cochran

Researchers should use their muscles and brains to solve the global health problems of the poorest countries and expand research studies to include low- and middle-income international populations, urged Dr. Hans Rosling at a recent lecture that drew a capacity crowd.

Rosling has a reputation as the man who proves statistics are not boring, and he did not disappoint. Known as the guru of global health data, Rosling told stories using charts populated with colorful bubbles representing countries. Bubbles scattered and regrouped as Rosling showed changes in income, fertility and life expectancy over decades and centuries. A co-founder of Gapminder, a nonprofit that promotes a fact-based world view, he used the organization's Trendalyzer software to convert numbers into interactive graphics.

The lecture, *The New Health Gap: Science for Emerging Economies vs. the Bottom Billion*, was sponsored by Fogarty as the final in a series of Scholar-in-Residence lectures marking its 40th anniversary.

"Global health is full of ignorance," Rosling said, "full of myths. There's so much to sort out." He sped through misconceptions about HIV, stating, "There is no such thing as an African HIV epidemic." We also don't understand the speed and magnitude of scientific and economic progress in Asia, he added.

To best understand the world today, it can no longer be categorized as the developing world versus the Western world. It is more appropriate to use high-, middle- and low-income categories. Once-developing countries are now emerging economies.

He told an anecdote about top medical students in Sweden in his global health class. Discussing life expectancy, they believed smaller families have greater life expectancy. Rosling put 1950s data into his charts and showed the NIH audience that the students' hypothesis worked for 1950.

While he fast forwarded to 2007, Rosling recited a timeline of developments such as China's Great Leap Forward, family planning, vaccinations and the HIV epidemic. Bubbles flew as global birth rates dropped, landing in a very different pattern. Today, India has a 2.8 birth rate, Bangladesh 2.4 and Iran 1.85, disproving the students' hypothesis.

"Now take it out of the bedroom and into the bathroom and kitchen. If you have water, soap and food on the table,



Dr. Hans Rosling spoke at NIH as a Fogarty Scholar-in-Residence, a special program to mark the Center's 40th anniversary.

Photo by Ernie Branson

you'll live 65 years," said Rosling. "Then we come in, our profession, and try to make it longer." Populations used to first get rich, then healthy. Now, it's the other way around.

In addition to diagnostics and access to treatment, drugs play a major role in global health. Rosling applauded broadened international sponsoring of pharmaceuticals, a new realism about pricing in lower income countries and branding their own generics, but said that most support is allocated to AIDS, TB and malaria. People with other diseases often have to personally raise money for their care, or do without. Middle-income populations can get diagnosis and limited treatment, but they can't benefit from all the progress yet.

“Global health is full of ignorance, full of myths. There is so much to sort out.”

— DR. HANS ROSLING

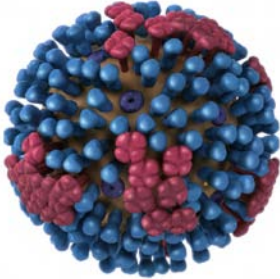
"I see two research components to global health," concluded Rosling. He recommended solving the health problems of the poorest. "Make that new TB diagnostic test that can be used by primary health care providers in the village and you can die satisfied."

Second, "Don't limit your exposure and your genetic variations to high-income populations. Do research on diabetes and Parkinson's across the world, where there is a variation, because it pays off."

Videocast: <http://bit.ly/9gacJX>

New research shows low absolute humidity drives flu outbreaks

Illustration by Don Higgins, CDC



The ultrastructure of influenza virion

The annual spike in winter influenza epidemics has been traced to low absolute humidity, which creates environmental conditions that support the virus' survival and spread. The study was conducted by Fogarty grantee and climatologist Dr. Jeffrey Shaman and collaborators that included Fogarty scientist Dr. Cecile Viboud.

Their findings were recently published in *PLoS Biology*.

This discovery discredits theories that the flu is strongest during cold weather because people cocoon indoors, get less fresh air and exercise, or have generally weakened immune systems. The researchers say that although a natural reaction to this study may be running a humidifier all winter, vaccination remains the best defense against the flu.

The effects of temperature, solar radiation, the school calendar and other potential influences were also examined but the data indicate that absolute humidity alone is sufficient to explain observed seasonal variations of influenza transmission in temperate regions.

Absolute humidity is the quantity of water vapor in a particular volume of air, regardless of the temperature. This is not to be confused with relative humidity,

H1N1 *...continued from p. 1*

effects. Adding to that argument is recent news that out of 229 million doses of H1N1 vaccine that were made, approximately 71.5 million are about to expire and may be destroyed.

The authors affirm the recommendation to include the pandemic H1N1 virus antigen in the next seasonal vaccine formulation and urge government and public health organizations to be vigilant, and continue vaccination efforts and other preparations.

The full article is available at: <http://bit.ly/dis6p7>

Preliminary Estimates of Mortality and Years of Life Lost Associated with the 2009 A/H1N1 Pandemic in the US and Comparison with Past Influenza Seasons. Cecile Viboud, Mark Müller, Don Olson, Michael Osterholm, and Lone Simonsen. *PLoS Curr Influenza*, 2010 March 20: RRN1153.

which is temperature-dependent.

Most indoor environments are temperature controlled, but indoor absolute humidity levels fluctuate as outdoor absolute humidity levels change.

"In some areas of the country, a typical summer day can have four times as much water vapor as a typical winter day—a difference that exists both indoors and outdoors," says Shaman, a professor at Oregon State.

For this study, Shaman and his colleagues extended their previous findings on absolute humidity and influenza from the laboratory to the human population. They compiled flu onset dates from 30 winters and found periods of low absolute humidity preceded 55-60% of the outbreaks.

The roots of seasonal flu patterns are of basic scientific interest and public health importance. The association of low absolute humidity with the onset of outbreaks, which have significant annual variation, suggests that accurate and timely forecasts of approaching flu epidemics could be developed. Being forewarned could potentially aid public health planning and intervention strategies.

The full article is available at <http://bit.ly/bNtTY>

Absolute Humidity and the Seasonal Onset of Influenza in the Continental United States. Jeffrey Shaman, Virginia E. Pitzer, Cécile Viboud, Bryan T. Grenfell, Marc Lipsitch. *PLoS Biology*, 23 Feb 2010, doi:10.1371/journal.pbio.1000316.



Photo by James Gathony, CDC

Scientists propose measuring H1N1 impact in life years lost. Its impact was greater than perceived due to deaths of a disproportionate number of children/young adults.

Disease modeling effort expands

By David Taylor

A group of scientists applying mathematical models to better predict the progression of infectious disease outbreaks has published recent findings on rotavirus and influenza transmission patterns and an analysis of how diseases travel between humans and animals.

Since mid-2008, the team has been working together as part of the Research and Policy for Infectious Disease Dynamics program—known as RAPIDD—with the goal of making modeling more useful for policymakers responding to infectious disease outbreaks.

While mathematical and computational modeling of infectious diseases is a vibrant and rapidly growing field, it's still a very new concept in many areas of public and veterinary health.

Photo courtesy: USAID



Scientists are using mathematical modeling to better understand how diseases travel between humans and animals.

“The idea of RAPIDD is to improve standards in infectious disease modeling” for better support of policy response, says Dr. Ellis McKenzie, Fogarty senior scientist. Managed by McKenzie and his academic counterpart Dr. Bryan Grenfell, a population biologist at Princeton University, the program has grown to involve about 50 scientists focused on topics including model hierarchies, zoonotic infections and vector-transmitted diseases.

Three recent papers in *Science* underscore the initiative’s broad view of the field. One effort, which included input from Fogarty director Dr. Roger I. Glass, examined rotavirus. The study used modeling to show that apparent waves of rotavirus moving from east to west across the U.S. were

probably due to patterns in birth rates, since the number controls how many susceptible infants fuel the epidemic. The research team showed that the model, using parameters of pre-vaccination dynamics, closely resembled the decline and lag in rotavirus epidemics seen in the vaccine era.

“In terms of RAPIDD’s aims, this is an unusual example of ‘out-of-sample’ model validation,” Grenfell says of the paper.

Another analysis, titled “Epidemic Dynamics at the Human-Animal Interface,” was produced by a team led by Dr. James Lloyd-Smith of the University of California at Los Angeles. It outlined gaps in disease modeling efforts and detailed the need for new models.

“Models incorporating spillover transmission—the defining process of zoonotic dynamics—are dismayingly rare,” the authors observed. Likewise, models rarely consider the “stuttering chains of transmission” by which minor outbreaks occur and die out as a disease moves from an animal host to humans. Stage III zoonoses, such as monkey pox, Nipah virus or H5N1 avian flu, are the best-identified threats for future pandemics among humans, and their dynamics should receive priority attention from modelers, the article urged.

A third paper examined the impact of immune escape on influenza transmission by using equine data combined with epidemiological models. Lead author Dr. Andrew Park, of the University of Georgia, and his colleagues concluded the synthesis of disease data illustrated how herd immunity and immune escape are related and the ultimate goal is to link these results to epidemic dynamics. Their ideas could extend to a broad class of infectious diseases, they suggest.

Funded by the Department of Homeland Security through the White House National Science and Technology Council, the RAPIDD initiative offers what McKenzie calls a good example of dual use results. Models for responses to bioterrorist attacks, for example, can often be useful against natural epidemics, and vice versa.

Grenfell agrees. “Many vector-transmitted infections are particularly underserved mathematically,” he says, “and a new RAPIDD working group on mosquito-transmitted infections is now addressing this gap.” He adds that exploring how models can more directly tackle issues related to policy decisions could be an exciting direction in the future.

FOCUS

Fogarty trainees: improving global health

By Ann Cochran

Whether they are ensuring the safety of water in rural Argentina, advocating for the mentally ill in Indonesia, or combating HIV and sleeping sickness in Africa—Fogarty trainees are improving health in their home countries and making scientific discoveries with broad potential.

A lack of well-trained in-country scientists is a key barrier to improving health in many developing countries. Fogarty has worked to address this gap for four decades, supporting significant research training for about 5,000 scientists worldwide. Its flexible programs foster equitable, long-term research partnerships among U.S. and foreign scientists, support rigorous scientific training and encourage multidisciplinary approaches.

By providing re-entry support, Fogarty programs are successful in helping trainees return home to positions where they can make research contributions and continue to progress in their careers. Here are the stories of four trainees who returned home and are making a difference.

Dr. Johnson Ouma

Principal Research Scientist, Trypanosomiasis Research Center, Kenya Agricultural Research Institute



Photo courtesy of Dr. Ouma

With Fogarty support, Dr. Johnson Ouma studied genetics at Yale University.

“Stories my dad told me of misery inflicted upon our people—and their livestock— by tsetse flies and trypanosomiasis inspired me at an early age to study science so I could find ways of controlling this menace,” says former Fogarty trainee Dr. Johnson Ouma, who studies the genetics of tsetse populations to improve methods of control.

More than two-thirds of Kenyan land is tsetse-infested. Tsetse flies are bloodsucking insects that transmit human African trypanosomiasis, called sleeping sickness because it eventually causes sleep disorders. Trypanosomiasis also affects livestock, causing a related debilitating disease that impacts the availability of milk and meat for the rural poor.

There are no vaccines for this potentially fatal illness, but it can be treated if diagnosed early. Treatment isn’t easy: the drugs have high toxicity. Unfortunately, cases of parasite resistance are on the increase.

With Fogarty support, Ouma was a junior faculty trainee during the summer of 2009 at Yale University’s School of Public Health, mentored by Dr. Serap Aksoy and Dr. Adagalsia Caccone. He worked for them as a trainee at the Trypanosomiasis Research Center, where they are co-

investigators on a capacity-building project under Fogarty’s Global Infectious Disease Research Training Program.

At Yale, Ouma conducted experiments on tsetse population genetics with Caccone. He advanced his understanding of genotyping, increased his knowledge of how to format data, and learned to use different kinds of population genetics software that he could apply to his work at home.

After the course ended, Ouma helped organize and conduct a training workshop on vector biology in Kampala, Uganda. At that meeting, he received a scientific merit award from the African Union’s International Scientific Council for Trypanosomiasis Research and Control.

Ouma’s work in population biology of tsetse flies examines how far and wide the populations move, and if seemingly isolated groups are genetically related. Traps and insecticide-impregnated targets have been unsustainable after the inevitable resurgence of tsetse. To understand past control failures, Ouma is pursuing several research questions: did tsetse from other populations re-invade cleared areas? If so, what are the likely sources of re-infestation? How isolated are tsetse populations?

Data he generated led to co-authorship of a paper about control of tsetse that was published recently by *PLoS Neglected Tropical Diseases*.

Soon after he returned to Kenya, Ouma was promoted to principal research scientist at the government’s Trypanosomiasis Research Center where he is deputy center director.

Photo by Ben Abomo, USAID



And at Kenya's Maseno University, Ouma is an honorary assistant professor of zoology. He currently mentors and advises seven graduate students.

"My goal is to become a full university professor or director of a successful national or regional research institution, providing progressive leadership in scientific research on trypanosomiasis and other neglected vector-borne tropical diseases," says Ouma.

More than two-thirds of Kenyan land is tsetse-infested. The flies transmit human African trypanosomiasis, also called sleeping sickness. Livestock get infected with a related disease that reduces milk and meat for the rural poor.

Dr. Irmansyah

Director of Mental Health, Indonesia



A proponent of human rights for the mentally ill, former Fogarty trainee Dr. Irmansyah was recently appointed Indonesia's director of mental health. Irmansyah is not afraid to say that—as in many developing countries—psychiatry is a neglected branch of medicine in Indonesia. He shared his views in a recent article he authored for *The International Journal of Mental Health Systems*.

His particular interest in community mental health services developed during a research project early in his career. "I went to a rural area looking for patients with schizophrenia. Some had been restrained for years. That was not every schizophrenic's fate, but it wasn't unusual," says Irmansyah. "I also interviewed people who had struggled to take care of a family member with schizophrenia. What encouraged me were families that wanted to let the patient get services, and learn how to take care of them better."

In his new role as mental health director in the fourth most populated nation in the world, where mental illness is highly stigmatized, Irmansyah faces daunting challenges. Indonesia has less than 500 psychiatrists to serve 230 million people, and there are minimal community services.

Although part of his agenda includes strengthening laws to protect individuals with mental disabilities, Irmansyah's mission is increasing awareness and building up the country's mental health services.

He recently spent a year on a Fogarty-funded fellowship at Harvard University studying genetic research methods. "The Fogarty program was great for my career," says Irmansyah. "I learned about advanced mental health services and systems. I took courses in anthropology and disaster relief. It also helped me communicate better, for articles and public speaking and advocacy."

The fellowship included support for a research project. Irmansyah led a team that studied the genetics of siblings with schizophrenia. The researchers developed family-based interventions and supported a nascent Indonesian Mental Health Association.



As Indonesia's new director of mental health, Dr. Irmansyah advocates for the mentally ill in a country with minimal community services and less than 500 psychiatrists for a population of 230 million.

When Irmansyah returned to the University of Indonesia in Jakarta after his fellowship, he was elected chair of the psychiatry department. That position, as well as his work in disaster relief in Aceh after the 2004 tsunami, brought him to the attention of the Ministry of Health.

His Harvard mentor, Dr. Byron Good, says Irmansyah has a deep commitment to building a community-based mental health system able to provide evidence-based psychiatric care. "His appreciation for both basic science and implementation research, his strategic vision and his desire to give a voice to Indonesians suffering from mental illness and their families, makes him a wonderful selection to serve as director of mental health. The Fogarty International Center can be proud of the role it played in his evolution as a leader in Indonesian psychiatry."

Dr. Agnes Moses

Physician-Scientist, HIV/AIDS Transmission, University of North Carolina Project, Malawi

Photo courtesy of Dr. Moses



Fogarty funded Dr. Agnes Moses' four-year medical residency at the University of Witwatersrand in Johannesburg, South Africa.

Dr. Agnes Moses describes herself as an unlikely physician. "My father, who died when I was 11, was semiliterate and my mother is illiterate. Against all odds, three out of the four girls in my family managed to get a university degree. This was not easy in our community. No girl ever completed grade 10! I am passionate about helping and encouraging less privileged children, especially girls, because I have come to understand that it takes the grace of God, discipline and good-willed individuals to realize one's dream."

Fogarty helped her realize her dreams through its AIDS International Training and Research Program that funded her four-year medical residency at the University of Witwatersrand in Johannesburg, South Africa. Her residency took her from being a general practitioner to an internist with specialties in HIV and cancer.

Previously, Moses worked for the University of North Carolina's Project-Malawi, supported by Fogarty. She spearheaded a program to reduce mother-to-child transmission of HIV. Her mentor, Dr. Charles van der Horst of UNC, recalls his first hire. "She had everything up and running at a breakneck pace and it quickly became the model for how these programs should be operated."

Representative of Moses' work is an uneducated 32-year-old mother who came to the clinic, was HIV-positive and eligible for antiretroviral therapy, but decided to seek traditional therapy. "That usually includes finding out who bewitched whom, or exorcism of evil spirits. It broke my heart," says Moses.

Out of a population of only 12 million in Malawi, almost 1 million people are living with HIV/AIDS, including more than 90,000 children. Annually, an estimated 30,000 newborns are infected with HIV by their mothers.

When Moses began working on this aspect of HIV transmission in 2001, only half the pregnant women in her region were being tested for HIV; a quarter of those were infected. Six weeks after birth, the disease had been transmitted to 26% of their babies. Thanks to testing and effective, inexpensive treatment, the rate of HIV infection at six weeks has been reduced by about half. The program reaches 60,000 pregnant women per year.

Moses authored a journal article for *AIDS*, reporting on her testing and prevention program for pregnant women. When same-day HIV testing was offered, it increased acceptance by almost a third. When women had to choose to opt-out of testing, only 1% did.

Photo by Virginia Lamprecht, courtesy of Photoshare



Dr. Moses leads a program to prevent mother-to-child transmission of HIV. In Malawi, 30,000 newborns are infected each year by their mothers.

In recognition of her work, the Elizabeth Glaser Pediatric AIDS Foundation honored Moses with its prestigious International Leadership Award. Recipients are expected to mentor and train other promising clinicians, researchers and health care workers in their countries.

Moses juggles four roles between specialties in HIV and cancer. She is a senior clinical researcher on a clinical trial, does patient care and consulting at a clinic, is

leading cancer physician at the local hospital and she leads the HIV transmission program. Committed to her homeland, she says, "My measure of success is contributing to the welfare of the community, reducing HIV and cancer in Malawi."

Dr. Veronica Rajal

Clean Water Scientist and Professor, National University of Argentina at Salta

Clean water is the cause that motivates former Fogarty trainee Dr. Veronica Rajal. She monitors the rivers, lakes and irrigation channels in her native region in northwest Argentina for bacteria, viruses and parasites.

More than half the population in Rajal's study area lives in poverty. Many lack safe drinking water and hygienic sanitation. Acute diarrhea causes about 70,000 deaths and hospitalizations a year in Argentina. Infants and children are particularly susceptible.

While examining a polluted river recently, Rajal's team contacted a nearby school to obtain a control sample of water from the school's tap. It turned out to be more contaminated than the river. The researchers monitored the school's water source and are building a filtration system. "The commitment of the principal and the curiosity and participation of the children inspired us," says Rajal.

After earning her Ph.D. in engineering at Argentina's National University at Salta, she completed two years of postdoctoral research training under Fogarty grantee Dr. Jerold Last at the University of California, Davis. Her training was funded by Fogarty's International Training and Research in Environmental and Occupational Health.

Despite no prior experience with molecular biology methods, Rajal was able to lead research projects while learning new skills. "She brought tremendous energy and curiosity to my laboratory," says UC Davis professor Dr.

Stefan Wuertz. "With her excellent mentoring skills, my graduate students looked to her for advice when designing and performing experiments."

To better detect disease-causing bacteria and other pathogens in water samples, Rajal learned a method called real-time polymerase

chain reaction that uses enzyme activity to identify microorganisms through their DNA. She became so proficient, she was the lead author on the first-ever paper combining real time PCR with another advanced molecular technique, hollow fiber ultrafiltration. The article was published in the journal *Water Research*.



Photo courtesy of Dr. Rajal

With Fogarty support, Dr. Veronica Rajal completed two years of postdoctoral research training at the University of California, Davis.

higher level research position when she returned home to Salta, where she also teaches biotechnology, microbiology, and toxicology. She says her training also helped her win a re-entry grant from the Argentine Research Council.

She is working on developing a master's program in environmental engineering, has a leadership grant from the American Society for Microbiology and UNESCO, and has published ten journal articles, four of which she attributes to her postdoctoral training. In addition, she has created a research program to study water and soil contamination.

Rajal's training benefited her region in an unexpected way—when the expensive equipment for real time PCR was being replaced at UC Davis, the university donated the old one to Rajal's lab in Salta. That has made it possible for her to provide the region's only instruction in real-time PCR. When the H1N1 epidemic hit Argentina last summer, Rajal's lab was asked to help because they had the only equipment that could rapidly and correctly identify specific influenza virus strains.

For the future, Rajal says, "My hope is that public health and environmental authorities pay more attention to the fact that most gastrointestinal diseases, which especially affect infants, are attributable to contaminated water. Monitoring permits the identification of sources, which can be managed and mitigated."



Many areas of Argentina lack safe drinking water and proper sanitation, such as this new outhouse, causing significant health issues.

Photo courtesy of Pan American Health Organization

Global health experts seek to transform programs through implementation science

By Jeff Gray

Implementation science, or research to translate evidence-based findings into common practice, is quickly becoming an integral component of many global health programs. This novel approach to health research addresses knowledge gaps between innovations such as vaccines, drugs and care strategies and their delivery to patients and communities. Studies continue to show, for example, that the risk of HIV transmission can be reduced through condom use, yet infection rates continue to rise in some regions of the world. Research on implementation identifies barriers to proven interventions and facilitates the creation of local strategies to overcome them.

The concept of translating research into practice and policy was discussed in-depth at a recent two-day implementation and dissemination conference sponsored by NIH and a subsequent Fogarty satellite meeting focused on implementation science in the global health context. “It’s an area ripe for exploration,” said NIH Director Dr. Francis Collins. “Implementation science is part of our mission.” Collins says it’s important to ensure that research reaches communities in need, as well as conducting research to determine what works and what doesn’t in the real world.

The NIH conference, now in its third year, drew approximately 630 attendees and focused on methods and measures. Over 50 presenters showcased research and health care delivery projects addressing a wide range of issues, including war-related trauma, stroke care, community mental health, homelessness, STD prevention, family planning and school-based interventions.

“Research must combine relevance to decision-making,” said Dr. Julio Frenk, Dean of the Harvard School of Public Health, drawing from his experiences establishing highly successful, large-scale health programs in his native Mexico. “Excellence and relevance can have a fruitful relationship through knowledge translation.”

Implementation science is of particular importance to global health as the concept addresses hard questions such as how best to translate new findings into practice in different cultural settings, how to reduce the fragmenting of health systems into programs centered on a single disease—particularly in low-resource settings—and why health interventions lose efficacy over time or sometimes display unintended effects.

Lynn Freedman, professor of clinical population and family

health at Columbia University, warned of an additional challenge, namely, the “dangerous fallacy” that technical input, political will and money will amount to functioning services. She used the analogy (see box) of following a recipe, launching a rocket to the moon and raising a child as three problems with different levels of complexity. Implementation science falls into the most challenging category.

| Following a Recipe | A Rocket to the Moon | Raising a Child |
|---|---|---|
| SIMPLE (Puzzle) | COMPLICATED (Problem) | COMPLEX (Mess) |
| <ul style="list-style-type: none"> • The recipe is essential • Recipes are tested to assure replicability of later efforts • No particular expertise; knowing how to cook increases success • Recipe notes the quantity and nature of “parts” needed • Recipes produce standard products • Certainty of same results every time | <ul style="list-style-type: none"> • Formulae are critical and necessary • Sending one rocket increases assurance that next will be ok • High level of expertise in many specialized fields + coordination • Separate into parts and then coordinate • Rockets similar in critical ways • High degree of certainty of outcome | <ul style="list-style-type: none"> • Formulae have only a limited application • Raising one child gives no assurance of success with the next • Expertise can help but it is not sufficient; relationships are key • Can’t separate parts from the whole • Every child is unique • Uncertainty of outcome remains |

Source: ODI presentation, Exploring the science and complexity of aid policy and practice, London, 09 July 2008

Global health experts sometimes mistakenly view implementation science problems as complicated rather than complex.

Often a collaborative process involving experts from a wide range of disciplines, implementation research in the global health field has helped clinicians to identify and solve such problems more quickly, while improving the performance of programs using scientifically valid methods. It has also assisted program managers and policymakers to make decisions based on evidence instead of assumptions and has even helped managers and staff at health facilities better understand how their own programs work.

“Effective program implementation must be multi-disciplinary,” said Fogarty Director Dr. Roger I. Glass. “We need to think with an open mind how to make these programs work. We’ve seen lots of money for activities, but our programs are not as effective as they could be. In every realm of interventions, we have lots of knowledge that isn’t applied.”

Argentine scientist Dr. Jose Belizan echoed the sentiment. He encountered numerous obstacles while studying ways to improve birth practices. These barriers included lack

...continued on p. 12

Fogarty grantees employ implementation science to reduce maternal deaths in Nigeria

A pregnant Nigerian woman begins to bleed at noon. After she and her husband are turned away from several medical facilities over the course of the day, she is finally admitted to a hospital in the evening. She dies early the next morning without ever having received treatment. This occurrence is not uncommon in northern Nigeria, where there are 1,000 deaths for every 100,000 births.



Photo by Terry Lo

Cultural practices—such as early marriage of Nigerian girls—pose barriers to implementing maternal health programs.

To address this tragedy, Fogarty grantees Drs. Daniel Perlman and Malcolm Potts and their colleagues at the University of California, Berkeley, have been implementing a maternal health research program in partnership with their Nigerian counterparts at Ahmadu Bello University. The collaboration has already had an impact—introducing new post-partum drugs that help stop bleeding, addressing some infrastructure limitations and promoting education for girls. Administered by a Nigerian advisory group made up of researchers, medical practitioners and other experts, the initiative's long-term goal is to enhance the ability of Nigerian researchers to carry out research that will improve maternal health.

Nigeria is plagued by socioeconomic factors that contribute to maternal mortality and birth-related injuries, including ineffectual government, under-resourced hospitals and gender inequalities. Cultural issues such as pressure on girls to marry early and give birth to numerous children,

preferences to deliver children at home and mistrust of family planning services are also factors. “Overall, women have few life choices outside of marriage and childbirth, further contributing to their own desires for large families,” said Perlman, a medical anthropologist. “The terms of marriage are such that women have little decision-making control, including control over their own health.”

Perlman's research partners at the university received permission from the Nigerian government to determine the safety of community-based use of misoprostol, a drug proven to safely prevent post-partum hemorrhage during home births in other parts of Africa. They also determined that lack of electricity in rural areas seriously impairs the ability of hospitals to deliver care, leading to the development of solar energy systems that now power blood bank refrigerators, ultrasound machines, communications equipment and lights in operating rooms.

Additionally, the community-based research supported by the project led to a partnership with village parent-teacher associations, schools and religious groups, with the goal of promoting the education of girls and increasing the age of marriage. One of the researchers discovered that many parents are open to the possibility of leaving their daughters in school and delaying matrimony when offered assistance with school fees, books and related expenses. “Our research showed that school attendance could provide teenage girls with a socially acceptable alternative to early marriage,” said Perlman.

Each year, the program provides field research training for 12 postdoctoral fellows. They are assisted by health workers and community members, who help them identify key problems and assess the quality of care at clinics and hospitals. One of their most significant findings was that delays in receiving care at health facilities appeared to be the biggest factor in maternal deaths. The fellows' ethnographic fieldwork has also increased the understanding of the challenges faced by rural Nigerians trying to access care.

The program will soon begin studies that will engage health workers in evaluating and improving the quality of their services. “Our long-term goal is to train a critical mass of highly skilled Nigerian health researchers able to conduct community-based research,” said Perlman. “This should result in innovative approaches to the prevention of maternal and child mortality and morbidity.”

Global health experts...

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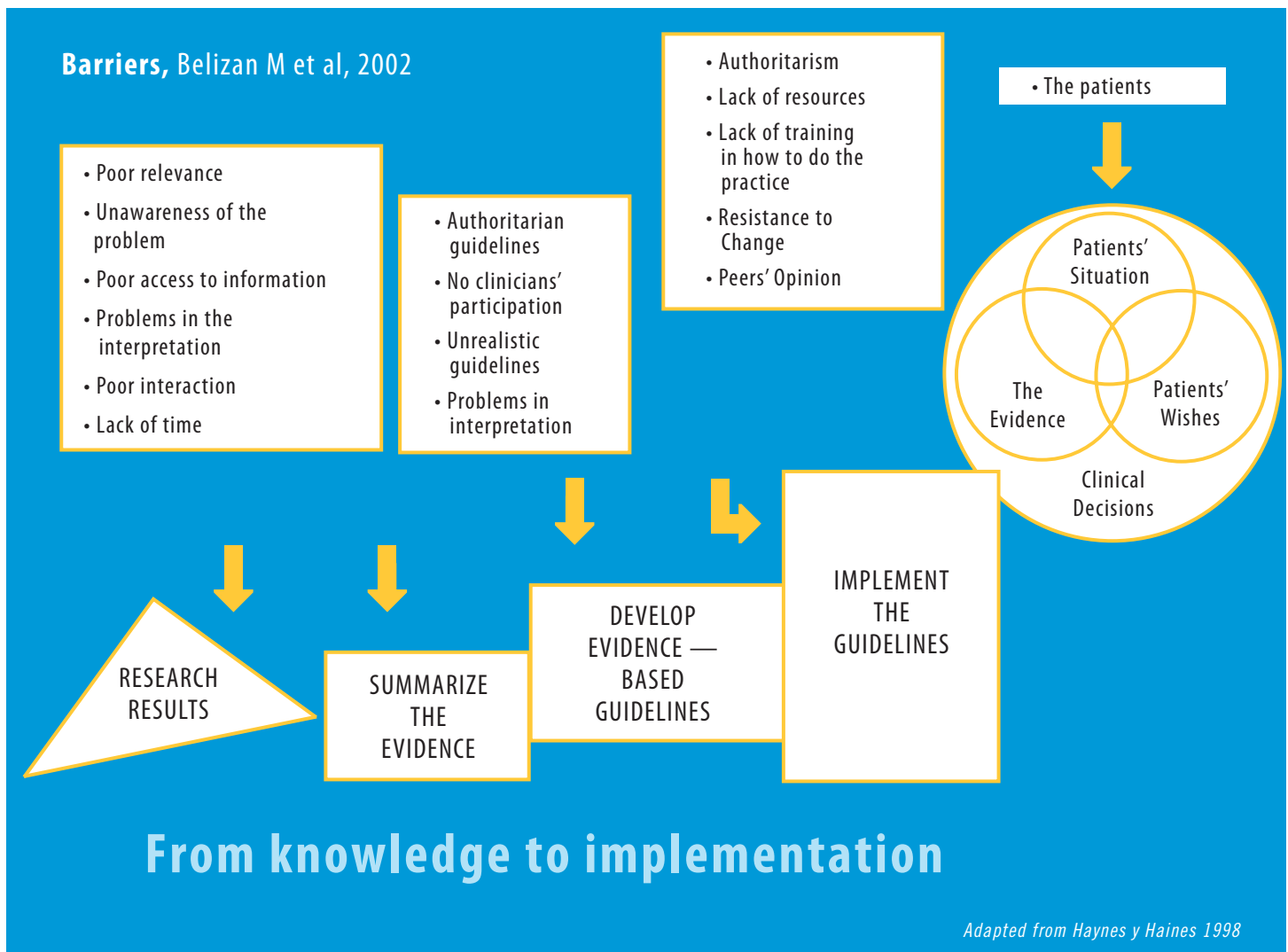
of awareness of the problem, poor access to information, authoritarian guidelines, difficulty getting clinicians to participate, interpretation problems, lack of resources and training and resistance to change (see box).

Other presenters cited cultural barriers such as stigma and taboos related to mental health in China, fetal alcohol syndrome in Russia and maternal mortality in Nigeria (see related stories on pages 11 and 13).

Several Fogarty programs are helping researchers address some of these obstacles through research and training efforts in low- and middle-income countries. Through its Framework Programs for Global Health, Fogarty is supporting grantees' efforts to develop implementation science curricula by bringing together multiple schools and disciplines at research universities with global health programs.

In addition, its International Clinical, Operational and Health Services Research and Training Award program supports implementation science and related research focused on chronic, non-communicable diseases and disorders as well as infectious diseases such as AIDS, TB and malaria. The program also helps to identify skills needed to design effective interventions that can be scaled up to entire health care systems and populations in need.

Finally, a new program, the Medical Education Partnership Initiative, will operate in sub-Saharan Africa in collaboration with the President's Emergency Plan for AIDS Relief—known as PEPFAR—to bolster HIV/AIDS interventions by expanding the ranks of well-trained clinicians, building the capacity of local scientists and health care workers to conduct multidisciplinary research and increasing retention of clinical professors and faculty at medical schools.



Fogarty grantee Dr. Jose Belizan identified numerous institutional barriers he faced while conducting a study on birth practices in Argentina.

Researchers tackle fetal alcohol syndrome in Russia

Michelle Barry/CCP; Courtesy of Photostore



A Fogarty grantee is studying binge drinking among Russian women to reduce fetal alcohol syndrome and improve infant health.

Cultural norms, such as high alcohol consumption in Russia, often act as a barrier to implementing research findings that improve health. Alcohol use poses an alarmingly high risk for pregnancies and fetal alcohol spectrum disorders are common. Fetal alcohol syndrome, the leading cause of preventable mental retardation in the world, can also result in birth defects including abnormal facial features, growth problems, trouble remembering or learning, vision or hearing deficiencies and behavioral problems.

Dr. Tatiana Balachova, a Fogarty grantee and clinical psychologist at the University of Oklahoma, has taken the first steps to address the problem in Russia by establishing educational programs and physician counseling sessions for women at risk for these conditions. Her goal is to design an alcohol-exposed pregnancy prevention measure for non-pregnant women of childbearing age who are sexually active and use contraceptives inconsistently. Her hope is that this intervention will ultimately be delivered routinely to large numbers of women in obstetrics clinics across Russia.

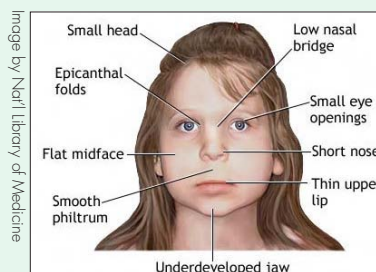
The first step was to assess the scale of the problem by conducting studies in two of Russia's largest cities, St. Petersburg and Nizhny Novgorod. "Alcohol consumption is widespread in Russia," said Balachova. "It is a social norm and a part of everyday functioning that affects the society in many ways." In a survey she and her team conducted of roughly 850 women, 57 percent of non-pregnant women reported inconsistent birth control practices, with 71 percent of the same group reporting binge drinking. Additionally, of the 11 percent of women trying to conceive, 66 percent reported binge drinking.

Though still in its early stages, Balachova's program has already made inroads. She completed an analysis of local needs and resources and identified available knowledge and existing evidence-based practices. She and her colleagues created educational materials and online training programs for medical personnel and the general public, and conducted training of physicians in prevention of the disorders.

Brief physician interventions, which are short counseling sessions ideally suited for people who abuse alcohol, were also conducted with preconceptional women. The latest phase of her project includes a randomized control trial designed to test prevention measures for women at risk for alcohol-exposed pregnancies.

Most importantly, she and her team have developed specific interventions based on alcohol consumption and exposed pregnancy risk data they gathered, using what she calls an "assessment driven translational research" approach. "So far, our research has been well received and we've gotten strong support from health administrations and medical professionals," she said.

Balachova faced cultural and institutional obstacles to implementing the programs, such as lack of motivation, time constraints of physicians, inadequate training of staff and even the belief that physicians shouldn't conduct brief interventions. She also encountered misconceptions such as the notion that harm is only caused if parents are intoxicated at conception and the idea that "normal" women don't drink and are not at risk. "There is a major lack of knowledge," said Balachova. "We need to base our interventions on assessments, not assumptions."



Fetal alcohol syndrome, thought to be widespread in Russia, can cause a wide range of birth defects.

Balachova says she has learned important lessons in capacity building and international partnerships since the program's inception. Though she did not initially recognize the importance of human subject protection, for example, she says that strengthening capacity

in this area of research has become an essential component. Likewise, she acknowledges the importance of communication and flexibility when operating across cultures. "International collaboration is a process," she said. "To be successful it has to be a true collaboration: participants must speak openly, educate, discuss, and be ready to make adaptations."

Implementation science critical to HIV/AIDS efforts

By Dr. Stefano Bertozzi

There is increasing recognition of the critical role implementation science can and must play in improved and broader delivery of HIV/AIDS prevention, treatment, and care services. However, several challenges remain for its use in health and the field of HIV/AIDS research, including those related to coordination, interdisciplinary collaboration, scientific design, validity of results, and generalizability of results.



Implementation science includes finding ways to encourage HIV testing, especially in rural populations such as this one in Peru.

There are a variety of other reasons why implementation science currently is not being supported or utilized at the level needed. First, no one owns implementation science. The work largely comprises disjointed, small-scale efforts with little coordination between those funding the research and those supporting service delivery. Second, implementation science necessitates interdisciplinary collaboration, and there is a lack of consensus on optimal scientific research approaches in the field. Third, as a complex health issue, the HIV/AIDS epidemic is difficult to address and the impact of interventions is frequently difficult to determine. This is particularly true in the area of prevention, where measures and proxies to determine incidence and behavioral outcomes are limited or poor. Fourth, the expectation of generalizability, central in biomedical and clinical research, may not be possible or necessary in much of implementation science research, because results may point to lessons that are applicable to only a single program, country, or region.

Lastly, there is a mismatch between expectations of researchers who report implementation science results and

implementers who are the end users of these results. Scientists generally want to produce results that have a high degree of certainty. From the perspective of the end users or implementers, any information that reduces uncertainty in their day-to-day decision making has value. A shift in thinking to value the output of research designs in less tightly controlled, real-world circumstances has an impact on both studies considered for funding and the application of results generated through research.

In public health, perfection is often the enemy of the good. Implementation science and operations research within the context of health are labels often used to describe “soft research,” in which quality and reliability of results are questioned. In the case of implementation science, there may be a need to balance scientific rigor with the ability to conduct research that may have the most useful outcomes with the most positive impact. In some cases, a less rigorous study may produce greater expected public health benefit.

In this context, the term rigor should not be taken to imply a lower quality of research. Rather, because of the nature of the questions implementation science examines, this form of research often may not produce results with the same precision that other forms of research can. The rigor of a study can be preserved; the level of certainty that is sought from the research should be determined in advance, but with a larger confidence interval.

Establishing implementation science as a necessary and credible field will mean mentoring a new generation of researchers, increasing venues and mechanisms for disseminating findings, forging collaborations between classic researchers and program implementers, identifying unique roles for lead organizations in global health delivery and research, and creating a strategic approach for identification of implementation research priorities.

Dr. Stefano Bertozzi is HIV Director of the Bill & Melinda Gates Foundation's Global Health Program. This essay is a condensed version of his presentation to the recent "Expert Consultation on Implementation Science Research: A Requirement for Effective HIV/AIDS Prevention and Treatment Scale-Up," sponsored by the NIH Office of AIDS Research in collaboration with Pangaia Global AIDS Foundation. Full report: <http://bit.ly/aGPC8X>

PEOPLE

Global
HEALTH Briefs**Daulaire appointed HHS Global Health director**

Dr. Nils Daulaire has been appointed director of the HHS Office of Global Health Affairs. He will coordinate HHS global health and international affairs policies with other federal agencies, governments and multilateral organizations. Daulaire was previously president of the Global Health Council.

**USAID hires key leaders**

USAID administrator Dr. Rajiv Shah has announced new members of his leadership team including: Sean Carroll, chief of staff; Dr. Amie Batson (*left*) deputy assistant administrator for global health, a past Fogarty grantee; Dr. Ruth Levine, director of evaluation, policy analysis and learning; and Dr. Alex Dehgan, science and technology advisor.

**Pape receives award for fighting HIV-AIDS in Haiti**

Dr. Bill Pape, a longtime Fogarty grantee in Haiti, received a Carlos Slim 2010 Health Award “for his contributions to fighting HIV-AIDS in poverty-stricken areas of the Caribbean and Latin America.” This new award, given to distinguished international health researchers, comes with a generous monetary prize. Pape is director of the GHESKIO center, the first AIDS treatment center in the world.

**Black receives global pediatric research award**

Fogarty board member Dr. Robert Black, chairman of Johns Hopkins' Bloomberg School of Public Health, received the 2010 Program for Global Pediatric Research Award for his long dedication to global child health, clinical and research excellence and his role as a teacher and mentor.

**Kington named Grinnell president**

Former NIH acting director Dr. Raynard Kington has been named president of Grinnell College in Iowa, and will take up his new post in July. Kington joined the NIH in 2000 as director of the Office of Behavioral and Social Sciences Research. Since February 2003, he was principal deputy director, and from November 2008 until Dr. Francis Collins became NIH Director, he served as acting NIH director.

**EC has new research commissioner**

Irish politician Máire Geoghegan-Quinn has been named Europe's Commissioner for Research and Innovation. She will preside over the design of the Eighth Framework Program of Research, the EU's main science-funding mechanism. Up to 100 billion euros will be awarded over seven years, primarily to European researchers but scientists from other countries, including the U.S., can also compete for funding.

Wellcome releases new strategic plan

The Wellcome Trust has released a new strategic plan identifying five goals that will guide their support during this decade: maximizing the health benefits of genetics and genomics; understanding the brain; combating infectious disease; investigating development, aging and chronic disease; and connecting environment, nutrition and health. Full report: <http://bit.ly/a5M7yH>

Rockefeller issues eHealth report

The Rockefeller Foundation has issued a report on eHealth titled “From Silos to Systems,” intended to expand the use of technology. The report was based on consultations with more than 200 global health experts. Full report: <http://bit.ly/8Zh9u9>

IOM issues global heart disease report

The Institute of Medicine has issued a report with recommendations to combat global heart disease titled, “Promoting Cardiovascular Health in the Developing World.” More than 80% of deaths worldwide related to cardiovascular disease occur in low- and middle-income countries. This report was sponsored by NIH's National Heart, Lung and Blood Institute. Full report: <http://bit.ly/d7oqkW>

UN Secretary-General stresses importance of MDG targets

Failure to meet Millennium Development Goal targets by the 2015 deadline could result in increased instability, violence, epidemic diseases and overpopulation, warns U.N. Secretary-General Ban Ki-moon. A new U.N. report reviews progress and features specific recommendations to help various stakeholders reach the targets on time. The report highlights gaps, challenges and opportunities for the remaining five years. Full report: <http://bit.ly/dC4XMQ>

CSIS releases global health priorities

The Center for Strategic and International Studies' Commission on Smart Global Health Policy released recommendations for a long-term U.S. strategic approach to global health. Priorities include HIV/AIDS, malaria, and tuberculosis; women and children; prevention and management of health emergencies; U.S. capacity to match its global health ambitions; and investing in multilateral institutions. Full report: <http://bit.ly/9nl731>

Funding Opportunities

| Program | Contact | Receipt Date | Eligibility |
|--|---|--------------|--|
| The Medical Education Partnership Initiative (MEPI) (R24) RFA-TW-10-008 | Letitia Robinson, Ph.D., R.N. FICMEPI@mail.nih.gov | May 12, 2010 | Foreign institutions in sub-Saharan African countries that receive PEPFAR support—and their partners—can apply for programmatic and linked awards. U.S. institutions can apply to serve as the coordinating center for the initiative. |
| Brain Disorders in the Developing World (BRAIN - Non AIDS) (R21) PAR-08-113 | Kathleen Michels, Ph.D. michelsk@mail.nih.gov | May 14, 2010 | At least two investigators, one from an institution in a high-income country and one from an institution in a low- or middle-income country (as defined by the World Bank) must collaborate on the application. The contact PD/PI may be from either institution. The R21 allows planning and preparation for an RO1 grant application. |
| Brain Disorders in the Developing World (BRAIN - Non AIDS) (R01) PAR-08-112 | Kathleen Michels, Ph.D. michelsk@mail.nih.gov | May 14, 2010 | Applications must build on and develop research, resources and collaborations developed in a Brain Disorders in the Developing World R21 grant. At least two investigators, one from an institution in a high-income country and one from an institution in a low- or middle-income country (as defined by the World Bank) must collaborate on the application; either can be the contact PD/PI. |
| Fogarty International Research Collaboration - Basic Biomedical Research Award (FIRCA-BB) (R03) PAR-08-222 | Kathleen Michels, Ph.D. FIRCA@nih.gov | May 28, 2010 | Scientists with an active NIH-funded research grant and who want to initiate or extend international research collaborations in biomedical research in a low- or middle-income country (as defined by the World Bank) should apply. NOTE: Applications for research collaboration with investigators in sub-Saharan African countries are especially encouraged. |

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G8 reps meet at NIH to discuss African research capacity



Representatives from G8 countries met recently at NIH with leading researchers from sub-Saharan Africa, convened by Fogarty, to discuss how to move forward with commitments made at the 2009 L'Aquila Summit. The G8 Leaders Declaration had pledged to address health care improvement in Africa through a variety of strategies, including "developing networks of researchers and by working with our African partners to establish a consortium of interdisciplinary centers of health innovation." The consultation will inform preparations for the upcoming G8 summit to be held in Canada this June.