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GLOBAL HEALTH MATTERS

MAY/JUNE 2021

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

NIH to invest $100M to advance Artificial Intelligence

The evolving field of Artificial Intelligence (AI) has the potential to revolutionize scientific discovery and extend diagnostic capabilities to remote, underserved settings. A new NIH Common Fund program, called Bridge to Artificial Intelligence (Bridge2AI), will invest about $100 million over four years to tap into the power of AI to advance research to inform clinical decisions and individualize care.

AI, which encompasses many methods including modern machine learning (ML), offers potential solutions to many challenges in biomedical and behavioral research. AI uses computer algorithms to quickly find connections from within large data sets and predict future outcomes. It's already used to improve diagnostic accuracy, increase efficiency in workflow and clinical operations, and facilitate disease and therapeutic monitoring.

Bridge2AI will support the generation of new data sets amenable to AI/ML analysis at scale; development of data

standards; production of tools to accelerate the creation of FAIR (Findable, Accessible, Interoperable, Reusable) AI/ML-ready data; design of skills and workforce development materials and activities; and promotion of a culture of diversity and ethical inquiry throughout the data generation process.

Foreign organizations are eligible to apply to the program's data generation component. Foreign components only may be included in applications for the coordination center. The deadline for both is August 20, 2021. For more information, visit https://commonfund.nih.gov/bridge2ai.

NIH takes action against sexual harassment

NIH has removed 75 principal investigators due to instances of sexual harassment or other forms of misconduct, according to a recent update to the Advisory Committee to the Director. Since 2018, the agency has received sexual harassment allegations regarding 215 individuals—in addition to reports of other types of harassment, bullying or racial discrimination—according to Dr. Michael Lauer, director of the Office of Extramural Research. Other grant actions were taken in 27 cases, such as imposing requirements for mandatory external climate reviews. More than 300 cases of all types of misconduct have been processed so far.

NIH also has a fairly low threshold for removing scientists from the peer review process and has so far barred 125 from participating, Lauer said. "If there are credible concerns, we will remove a person from peer review. If it turns out that everything is fine, then we can restore the ability to invite them for peer review. But we want to maintain the integrity of peer review above all."

The bulk of the allegations have come through NIH's website form, established in 2019. More recently, NIH added a hotline to receive information by phone.

NIH has also developed and posted the process for handling allegations of sexual harassment that occur on NIH-funded projects at recipient institutions, as well as taking steps to address harassment at scientific conferences. Lauer said NIH is continuing to spread the message that "we do not tolerate sexual harassment in NIH-funded research." Resources: http://bit.ly/ACOD_harassment

FOCUS

Breastfeeding in LMICs poses complex research issues

- Cultural factors influence nursing practices
- Water insecurity can disrupt exclusive breastfeeding
- Findings help reduce HIV transmission via breast milk

Read more on pages 6 – 9

Fogarty publishes HIV concept mapping project

A team of scientists has completed a concept mapping exercise to identify factors that impact the implementation of HIV prevention and intervention programs for adolescents in sub-Sah2aran Africa. The project was published as an open-access article in the journal *Implementation Science Communications* and is part of the NIH-Fogarty Adolescent HIV Implementation Science Alliance (AHISA) Initiative.

AHISA participants responded to the question: "In your experience, what factors have facilitated or hindered implementation of evidence-based HIV prevention or treatment for adolescents in sub-Saharan Africa?" The results were sorted into thematically relevant groups and each statement was ranked on its importance and changeability. In all, 15 distinct themes emerged. "Workforce/Workflow" and "HIV Stigma and Adolescent Development" were rated highest for importance, and "Threshold Conditions for Treatment" and "Structure of Implementation Efforts" were rated most changeable.

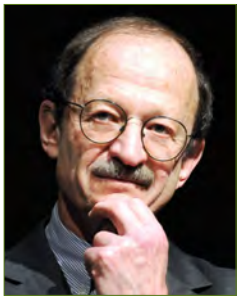
"Understanding implementation science determinants and mechanisms can facilitate the uptake of successful implementation and sustainment strategies for the prevention and treatment of HIV in a given context," the authors noted. The findings are intended to improve the scale-up of evidence-based practices for adolescent HIV prevention and treatment in sub-Saharan Africa. The authors suggest approaches that consider the determinants and mechanisms identified in the study will likely have utility for other health conditions and contexts.

Photo by Akintunde Akinleye/NURHI

Fogarty scientists have led a concept mapping exercise for HIV prevention and intervention programs targeting adolescents in sub-Saharan Africa.

The full article is available at http://bit.ly/AHISA_concept_mapping.

Former NIH Director leads new WHO Science Council



Former NIH Director and Nobel laureate Dr. Harold Varmus

As part of its transformation, the WHO has established a Science Council to provide advice on high-priority issues that could have a direct impact on global health.

Led by former NIH Director Dr. Harold Varmus, its members include several past and present Fogarty grantees, such as Dr. Adeeba Kamarulzaman of the University of Malaya, Dr. Salim Abdool Karim of CAPRISA in South Africa, Dr. Mary-Claire King of the University of Washington and Dr. Jean William (Bill) Pape of GHESKIO in Haiti. Additional members are Dr. Edith Heard of the European Molecular Biology Laboratory in Germany, Dr. Abla Mehio Sibai of the American University of Beirut, Dr. Denis Mukwege who is a gynecologist in the Democratic Republic of Congo and Dr. Yongyuth Yuthavong of the National Centre for Genetic Engineering and Biotechnology in Thailand.

Members of the Council serve in their personal capacity and represent a broad range of disciplines encompassing many aspects of science, from basic research to implementation science. Members are recruited and selected as acknowledged experts from around the world in the fields of basic science, translational and clinical research, social sciences, epidemiology and public health.

The Science Council will have the following functions:

- Evaluate urgent, high priority scientific issues and provide input and guidance on translating them to public health impact in furtherance of WHO's mission.
- Identify current and new science and technology issues that WHO needs to address, including global health threats, and new advances with a potential for direct or indirect impact on global health.
- Provide strategic orientation to WHO's actions in science, research and innovation.
- Participate in the rapid and confidential review of WHO normative products, when requested by the Director-General.
- Undertake other duties and functions consistent with these Terms of Reference, when requested by the Director-General.

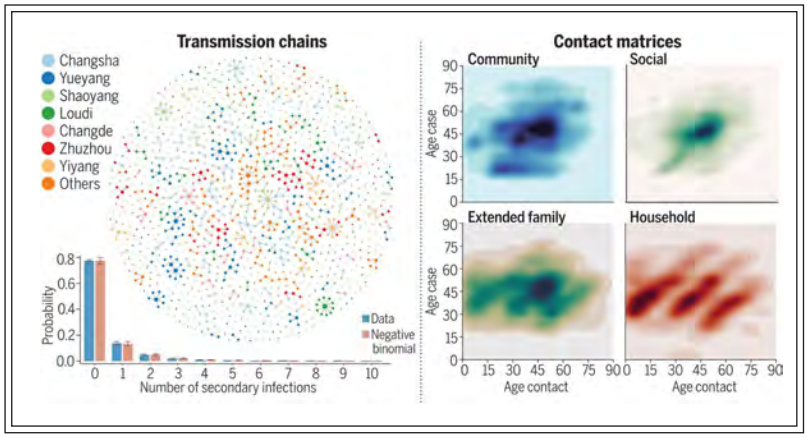
More information is available at: https://www.who.int/groups/science-council.

Fogarty modelers tap networks to tackle COVID-19

By Susan Scutti

Relationship-building and a commitment to open science underpinned Fogarty's many modeling triumphs during the COVID-19 pandemic. "Our international work has always been quite opportunistic," said Dr. Cécile Viboud, senior staff scientist. In 18 years with Fogarty's Division of International Epidemiology and Population Studies, Viboud has worked with pretty much any scientist wishing to collaborate on modeling projects and respiratory virus surveillance. "We had this network of collaborators that we had built for a long time and that helped Fogarty to begin sharing COVID-19 information early on," she said. In particular, collaborations with one team of Chinese scientists have been "incredibly productive." Dr. Hongjie Yu, originally part of the Chinese CDC, had spent time at the U.S. CDC and the NIH several years ago. "He has since gone back to China and is now at Fudan University, where he has been a great resource," said Viboud. "He also has a lot of good ideas."

Also playing an instrumental role was Fogarty's Chinese postdoctoral fellow, Dr. Kaiyuan Sun, who happened to be visiting family in China when the outbreak began. Soon back in the U.S., he saw the Chinese authorities were providing open-source data on early cases, including age, sex, travel and exposure history, and disease severity. "This was a big deal," Sun said. He and the team quickly collected, translated and formatted the information and shared it online. "We were the first group to share this type of data and after us other groups began to do the same."



Fogarty's disease modeling team studied transmission chains among SARS-CoV-2-infected individuals in China's Hunan province.

For Sun, research is all about relationships and connections. For example, his former collaborator, Dr. Marco Ajelli at Indiana University, noticed Sun's data sharing efforts online. Through Ajelli, the Fogarty team established a relationship with Fudan University and the Hunan CDC. That resulted in an important *Science* publication that estimated half of all transmissions occurred before patients showed symptoms, a unique feature of the SARS-CoV-2 virus and disease. Another significant contribution came from scientists in the Netherlands who used the data compiled by Sun to estimate the virus's incubation period, instrumental in establishing quarantine guidelines.

Deciding which pandemic-related project has been most important is difficult, said Viboud. "Our six-month projections via the Scenario Modeling Hub have been our most policy-relevant work; we've sent them to the White House, the CDC, the WHO and also some state governors." The CDC invited the scientists to publish an MMWR report on May 5th to help formulate guidance for local jurisdictions. When CDC Director Dr. Rochelle Walensky discussed the data at a White House press briefing, Viboud said the team realized that their projections were actually being used. A paper that appeared in *JAMA Internal Medicine* last summer is another undeniable standout. "This is the most read paper published in the journal ever. Not only was it the first estimation of excess mortality, but it also described conditions in New York City and the eastern seaboard, and drew comparisons to the 1918 flu pandemic," said Viboud.

Another significant paper looked at the early dynamics of the SARS-CoV-2 epidemic in Portugal and featured Fogarty's Dr. Nídia Trovão as co-lead-author. Trovão's pandemic work also included training scientists in low- and middle-income countries (LMICs) to use a portable genomic sequencing platform to generate full SARS-CoV-2 genomes, create genomic databases, and study virus mutation patterns and evolutionary dynamics. The immediate goal was to produce SARS-CoV-2 sequences to aid in pandemic response. Longer term, the hope is that genomics will help LMIC scientists better understand the viral dynamics within their countries so they can implement public health strategies to control them. "They are no longer dependent on scientists in higher-income countries to identify, analyze and interpret their results," Trovão observed.

"Despite the pandemic, we were able to run virtual workshops and train many scientists from Africa and Asia on topics from sample processing to complex analyses; this will pave the way for improved surveillance of COVID-19 variants globally and mitigate future pandemics" said Dr. David Spiro, division director.

RESOURCES

http://bit.ly/fogarty-modelers-covid

PROFILE

Fogarty Fellow continues Zika and dengue studies as NIAID lab chief

By Susan Scutti

In 2015, an outbreak of Zika fever swept South America and the Caribbean. Although infection typically caused only mild symptoms in adults, thousands of pregnant women who became infected suffered miscarriages and more than 3,700 delivered babies with microcephaly or other congenital abnormalities. Zika virus is a relative of the region's endemic dengue virus—both are mosquito-borne flaviviruses—so the epidemic raised questions about whether a prior infection with one of dengue's four serotypes might alter a person's risk of Zika disease, or vice versa. Fogarty Fellow Dr. Leah Katzelnick's project answered this by showing a previous Zika infection increases the risk of dengue disease severity.

Dengue itself sparks a complex immune response, explained Katzelnick, now chief of the NIH's National Institute of Allergy and Infectious Diseases (NIAID) Viral Epidemiology and Immunity Unit. A first-time infection with dengue generally causes no symptoms, or only mild ones. However, a previously infected person has an increased risk of severe disease if re-infected. "My original Fogarty project was proposing to look at the dynamics of the dengue antibody response over time in relation to immunity," said Katzelnick. "So, after your first infection, do your antibodies wane? Do only certain kinds of antibodies wane?"

Katzelnick, who was then a Berkeley-based collaborator working with a team in Nicaragua, arrived in South America in mid-2019—during the first post-Zika dengue epidemic. Witnessing "skyrocketing" cases, the team hypothesized that prior Zika infections might be causing "a more explosive dengue wave than we'd ever seen," said Katzelnick. She quickly pivoted her research to study how Zika immunity modified dengue disease.

Surprisingly, this wasn't the first time she'd changed course while a Fogarty Fellow. A political crisis in Nicaragua had prevented her planned arrival in early 2019, so she'd spent the first six months of her fellowship in Ecuador studying the dengue vaccine. Disheartened at first, Katzelnick soon embraced the "amazing opportunity to see how you set up one of these huge cohort studies before joining my Nicaraguan colleagues."

Leah Katzelnick, Ph.D., M.P.H.

Fogarty Fellow:	2018-2019
US Institution:	University of California, Berkeley
Foreign Institutions:	Universidad San Francisco de Quito, Ecuador National Virology Laboratory, Managua, Nicaragua
Research area:	Connection between Zika and dengue infections

Each project revealed dengue's insidious power in addition to different aspects of global health research. In Nicaragua, she tracked a powerful epidemic as it progressed, while in Ecuador, she developed a companion test for the dengue vaccine. "The vaccine can actually increase your future risk of severe dengue disease if you've never had an infection. So, we were looking for a test that would say 'yes' or 'no.' Are you positive for dengue or not?" Direct contact with primary investigators on each project proved invaluable. "While I knew the data really well, I didn't know how you actually do all this—coordinate a major cohort with thousands of people and bring experts in various areas together in a well-integrated system." Along with project management skills, she learned about the patient consenting process and helped to build capacity. "I taught different classes in both countries on new statistical methods for analyzing clinical data and on the use of open source programs and tools."

When her fellowship concluded at the end of 2019, Katzelnick transitioned to her current position at NIAID, where she continues to explore immune interactions between flaviviruses. "My Fogarty experience is the model for setting up our NIAID viral epidemiology and immunity lab," she said. "The fellowship taught me how to connect with new researchers on a project, find shared goals and reciprocally share and transfer knowledge." For Katzelnick, her Fogarty experience was "completely essential for feeling like a real researcher in global health."

RESOURCES

http://bit.ly/leah-katzelnick

Q&A

DR. EMMY OKELLO, MD, PHD, FACC

Dr. Emmy Okello is chief of cardiology at the Uganda Heart Institute and honorary associate professor at Makerere University. Okello graduated from Mbarara University School of Medicine and earned his Ph.D. from Makerere University. He received advanced training at Case Western Reserve University through a fellowship of the Medical Education Partnership Initiative (MEPI)—managed by Fogarty and funded by PEPFAR, the NIH Common Fund and the National Heart, Lung and Blood Institute. In recognition of his rheumatic heart disease research, Okello was named a Fellow of the American College of Cardiology.

Why cardiology?

In low-income settings, we're seeing an epidemiological transition to more coronary heart disease. Ugandans who are not exposed to high-income lifestyles are now presenting with heart attacks. This didn't happen 20 years ago. Why? Is it diet? High sugar levels? Our economy is weak and cannot sustain an epidemic of heart disease, so the answer lies in prevention. Yet, to prevent, we must first understand what is causing this shift. Is it the traditional risk factors for coronary heart disease as described in the West? Or is there something unique to our environment—is infection contributing to coronary heart disease? This is what I'm working to discover.

Tell us about rheumatic heart disease.

Rheumatic heart disease (RHD), which afflicts 40 million people worldwide, begins with a childhood sore throat. Most of the time, sore throats are triggered by viral illnesses, but 3 out of 10 times it is caused by strep A bacteria, which can result in *streptococcal pharyngitis.* In some people, that causes the body's immunity to act against itself, resulting in a febrile illness called acute rheumatic fever (ARF). Now, if you're in the tropics, fever could mean malaria or other febrile illnesses, so ARF is often missed or confused with something else. Yet, if you identify rheumatic fever, you can treat and stop it—an antibiotic and aspirin is usually all it takes. Unfortunately, if this stage is missed, the disease progresses and years later, as young adults, these patients show up in the hospital with full-blown rheumatic heart disease, usually with heart failure due to irreversible damage to their heart valves. My Ph.D. research focused on the burden, risk factors and outcome of RHD in Uganda, where the prevalence is about 3% yet only 1-2% know their status. With 70% of Uganda's 40 million population below the age of 35, RHD is an epidemic we cannot afford to manage. Our study also found 17% mortality, a result of late diagnosis when surgery is either impossible or unaffordable.

How did MEPI advance your career?

During my fellowship years, I was supported to conduct the first study of genetic susceptibility to RHD in Uganda. I also received advanced training in the U.S. at Case Western Reserve University. I focused on systems management that helped me grow as a scientific leader and advance as an early-career researcher. Peer-to-peer support was another part of the program and I continue to assist and promote faculty researchers at Makerere and the Uganda Heart Institute as a way to continue building research capacity in Uganda. When I went to Case Western, the culture was different, the medical system was different. Every day I was forced to think in new ways. It was life-changing! I learned how to run high-tech services, properly and under a lot of pressure, while delivering quality. When I came back, sometimes it was a little overwhelming because I knew how much needed to be done—back in Cleveland, everything ran like clockwork. Still, that became the motivation; I wanted to be part of the solution. For doctors from developing nations it is very important to see a system running properly. It changes your mindset and helps you understand that things can change.

What advice do you offer mentees?

Collaborate! Sometimes all you need is one colleague in a high-income country and another within your own country and from there you can build. It will take time to establish trust, to understand each other's capacities and mutual interests. Eventually, though, you get to the point where you can apply together for grants and become part of studies implemented across the globe. In collaborations, we researchers from LMICs can contribute our reverse innovations and share our knowledge of diseases the current generation of HIC doctors do not know. We have questions about certain diseases that may be unique to our environment and sharing will be of mutual benefit. There's so much opportunity to work together in a sustainable, respectful way.

RESOURCES

http://bit.ly/emmy-okello

NIH breastfeeding research essential to child health

Breastfeeding and infant nutrition in low- and middle-income countries pose complex research challenges.

UNICEF Ethiopia/2021/Nahom Tesfaye

Although six months of exclusive breastfeeding (EBF) has long been recommended by the WHO to promote healthy child development, progress has stalled in some low-resource settings, jeopardizing efforts to reduce infant mortality. Only about 38% of the world's infants benefit from EBF for the first 180 days of life.

A number of barriers exist in low- and middle-income countries (LMICs) and each poses unique research questions. In some places, cultural practices mean women discard the antibody-rich colostrum or delay nursing. Other mothers find it challenging to balance breastfeeding with formal employment or fulfilling household needs for firewood and clean water. Milk banking has proven a successful solution in some locations but is difficult to scale-up in rural areas. For moms living with HIV, drug therapies have reduced the risk of transmission through breastfeeding, but the virus is still a danger that must be managed. NIH studies have also explored other aspects of infant nutrition, such as the ability of breast milk to help LMIC infants deal with early and frequent exposure to infectious diseases. Finally, advances in microbiome research hold great potential to help scientists better understand the relationship between breastfeeding and infant health.

The notion that breastfeeding provides the healthiest start in life is founded on decades of research. "Breastfeeding alternatives in low-income settings are often both inadequate in nutritional content and also very prone to bacterial contamination, which leads to a high risk of diarrhea, and both factors contribute to the malnutrition we see with non-breast-fed babies," explained Dr. Robert Black, a professor at Johns Hopkins University who has led child nutrition studies for decades. Frequently examined topics include ways to encourage breastfeeding and how to achieve sufficient nutrition from complementary foods while breastfeeding within specific societies and settings, according to Black.

A significant factor is that employment among LMIC mothers has skyrocketed in the last 20 years, with about half now working outside the home. In a Fogarty-supported study of about 1,000 mothers of newborns in Kenya, about 40% of those with formal employment had ended EBF by three months, the maternity leave period mandated by the government.

For premature and sick infants whose mothers cannot nurse, milk banking has proven successful in countries such as South Africa and India. PATH scientist Dr. Kiersten Israel-Ballard has studied the feasibility of expanding the practice to rural and underserved areas in LMICs. "Milk banks could play a critical role in ensuring that exclusive human milk diets are possible for all infants, especially those who are most vulnerable, such as pre-term babies, and possibly including those in emergency situations, such as conflict zones, natural disasters or other humanitarian crises," she said. But turning this vision into reality will require an investment in implementation research and establishment of ethical guidelines and safety standards.

Studies are also needed to learn more about breast milk itself, said Dr. Dan Raiten, a program director at the NIH's National Institute of Child Health and Human Development. "What we're trying to do is change the paradigm and recognize the importance of this very complex biological system—the notion that human milk is more than just the sum of its parts," Raiten noted. He recently convened a group of scientists to stimulate the infant nutrition research community, gather information about what is established science and identify research gaps. Five work groups are exploring the biology and ecology of breast milk, the impact of the infant-mother relationship, possible methodologies for advancing this research, and translation and implementation science. Raiten said the setting is of paramount concern. "Context matters—the decisions made about infant feeding are going to be different depending on your context. This initiative is a response to a global need, a domestic need and a fundamental need to understand the biology of human milk."

Articles in this section by Susan Scutti
Resources: http://bit.ly/breastfeeding-lmics

Cultural factors influence breastfeeding practices

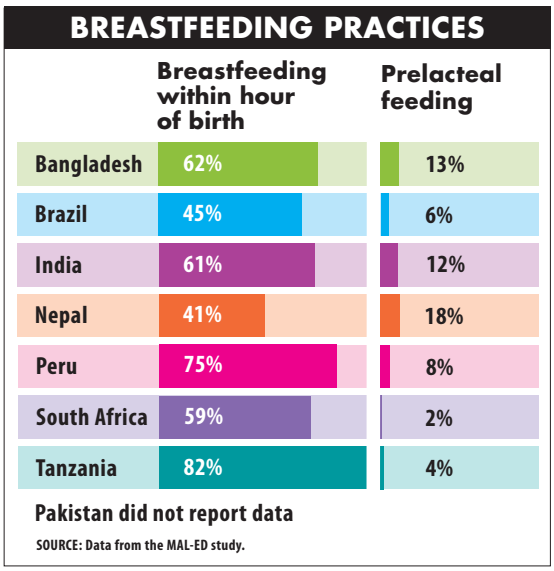
Infants in low-resource settings may be malnourished and are likely to endure numerous intestinal infections in the first years of life. To better understand how that affects their health and development, an international team working in eight low- and middle-income countries (LMICs) followed about 2,000 newborns for their first two years of life. Known as MAL-ED, the Etiology, Risk Factors and Interactions of Enteric Infections and Malnutrition and the Consequences for Child Health and Development project was funded by the Bill and Melinda Gates Foundation and co-led by Fogarty and the Foundation for the NIH. The program—begun in 2009 and still generating publications—operated study sites in Bangladesh, Brazil, India, Nepal, Pakistan, Peru, South Africa and Tanzania.

"MAL-ED was designed to characterize very carefully the diet of the child, including breastfeeding and the introduction of complementary foods, as well as to characterize gut health," explained Dr. Laura Caulfield, one of the project's 120 principal investigators.

An examination of breastfeeding practices was included at all eight study sites. Despite WHO recommendations for exclusive breastfeeding for the first 180 days of life, the vast majority of babies—81%—transitioned to other forms of nutrition before that. Typically, exclusive breastfeeding lasted about a month before animal milks were introduced, quickly followed by solids. "The public health community also recommends breastfeeding be initiated in the first hour, which is best in terms of establishing a mother's milk supply and helps with neonatal adjustment to the extra-uterine environment," said Caulfield. Adoption of that guidance varied by country from 41% to 82%. (see chart)

Beyond nutrients, breast milk contains substances that foster growth and development, plus a host of immune factors that decrease the likelihood of pathogens causing disease, explained Caulfield.

A common impediment to exclusive breastfeeding is prelacteal feeds—the idea that you must give something to the baby before you start breastfeeding, such as honey or sugar water, explained Caulfield. This delays initiation, which in turn may limit production of a mother's milk. "In Pakistan a large majority of babies have prelacteal feeds," said Caulfield. "It's very culturally driven." Colostrum—the earliest breast milk produced after birth which is thought to be "unclean" in some cultures given its yellow color —was fed to a large majority of babies, more than 90% at each site. Yet, the practice of discarding colostrum still persists in some places, including Peru, according to another Fogarty-funded study.



Possibly the most insightful MAL-ED paper examined the fact that women go in and out of exclusive breastfeeding all the time, said Caulfield. Most mothers, for example, will need to go somewhere and so ask family or neighbors to feed their infants. The study's finding suggests the difficulty in "how you support women who are breastfeeding, and, if there have been gaps, how do you help a woman re-establish her milk supply so that she can successfully return to exclusive breastfeeding," said Caulfield.

The central finding of the MAL-ED study surprised researchers: pervasive, low-level exposure to pathogens—and not necessarily having diarrhea or becoming ill—was associated with underdevelopment. Caulfield said that was disconcerting "because in essence we were saying that it's not really getting ill but 'under the iceberg' kinds of things that cause growth faltering leading to stunting."

In some countries, women give babies honey or sugar water before initiating breastfeeding.

Photo by Carla Mattal/HEP+

Research findings prevent HIV transmission by nursing

In the days when HIV/AIDS was a death sentence, a recommendation against breastfeeding might have seemed the simplest way to prevent disease transmission to newborns. But scientists understood that would pose other risks. "We knew from the 1960s that early weaning often causes death in low-resource settings where risks of diarrheal and infectious diseases are high, and safe breast milk alternatives may not be available," said Dr. Grace Aldrovandi, UCLA scientist and a lead investigator in an international clinical trials network. "The WHO came out with the recommendation that HIV-infected women should exclusively breastfeed for four months and then abruptly wean."

To minimize risks of mother-to-child HIV transmission, scientists examined possible prevention strategies through the Promoting Maternal and Infant Survival Everywhere (PROMISE) study. Funded by the NIH's National Institute of Allergy and Infectious Diseases, PROMISE identified the most advantageous antiretroviral (ART) drug regimen for reducing viral transmission during pregnancy and breastfeeding. "PROMISE underscored the importance of maternal viral suppression and getting optimal ART," said Aldrovandi.

The feasibility of this approach was tested by weighing the dangers of early weaning against the risks of HIV in a study in Zambia. "Much to our surprise, at the end of two years, the same number of children in the abrupt weaning group died of infectious diseases as those that we let breastfeed longer who got HIV," said Aldrovandi. These results "surprised the field," yet, in time, "with the introduction of effective ART in sub-Saharan Africa, the calculus totally changed."

Before ART became widely available in Africa, scientists explored various solutions to the problem of maternal-child HIV transmission through breastfeeding. For example, PATH scientist Dr. Kiersten Israel-Ballard created a simple process so that a mother with HIV could flash-heat her own breast milk in her own home. A feasibility trial in Tanzania, funded by the NIH's National Institute of Child Health and Human Development, proved none of the samples contained bacterial pathogens and "also showed that if you gave mothers this option, many would use it," said Israel-Ballard.

Breastfeeding is still a critical issue in LMICs, where a significant number of babies remain at risk of HIV. "If you're a baby gestating in the womb of a woman with HIV who isn't taking antiretrovirals, you have three bullets to dodge," explained Aldrovandi. HIV can be transmitted from mom to baby in utero (about 10-15% of cases), during vaginal birth (about 20-30%) or through breast milk (depending on duration, ranges between 5% and 25%). "At no point in this cascade is it 100%," said Aldrovandi.

Women face many barriers to exclusive breastfeeding in low- and middle-income countries.

Photo by Tareq Salahuddin

While ART lowers the amount of virus in a mother's blood and decreases the amount transferred through breast milk, drug adherence is often less than perfect. "As we all know it is difficult to adhere to the meds. Breastfeeding lasts for a couple of years and that's a long time for a mother to remain suppressed, given that her HIV infection is probably number 20 on her list of things she's dealing with, such as taking care of other children, earning money and dealing with food insecurity," said Aldrovandi.

"What we are hoping for is longer lasting ART modalities to keep the mother suppressed and decrease baby's chances of becoming infected." In the meantime, Aldrovandi continues to puzzle over why some babies get HIV through breast milk and others don't.

"I did a study measuring HIV RNA in breast milk and the mammary epithelium is amazingly effective at keeping out virus. A woman can have a million copies in her blood but very little to none of it gets across," said Aldrovandi. Yet, she had seen in the years before ART that babies infected in utero did a lot worse than babies infected via breast milk. Aldrovandi and many of her peers are trying to better understand the relationship between maternal microbes and infant microbes, and how that ultimately affects infant health.

Water insecurity can disrupt exclusive breastfeeding

Lack of access to clean water can be a barrier to consistent breastfeeding for women who are among the 1.42 billion people that UNICEF estimates live in areas of high or extreme water vulnerability. In a study of individuals knowledgeable about household water management in 16 low- and middle-income countries (LMICs), about 90% reported that water insecurity negatively impacted how infants were fed.

UN Photo/JC McIlwaine

Mothers responsible for the household water supply often find it difficult to exclusively breastfeed, a study showed.

At some sites water insecurity was described as decreasing the frequency of breastfeeding episodes or delaying them, often because women had to leave their infants to collect water, said Arizona State University's Dr. Roseanne Schuster, lead author on the resulting publication.

"People felt that problems with water can decrease breast milk production, either due to the mother not drinking enough water or from the stress caused by water insecurity," Schuster said. In many countries, women are typically household water managers, which can be a difficult task to combine with childcare. "There are different ways that water problems affect women, some of this depends on local infrastructure and cultural expectations," Schuster noted. "One of the most interesting findings was how water was revealed to be integral to motherhood. Responses such as 'A real mother should always have water at home' suggest how the burden of problems with water fall on women, and that they too thought of it as their responsibility, even when others could help."

In the absence of sufficient, clean water, there was also concern that mothers could not properly wash their breasts before feeding. Others felt that breastfeeding women who drank polluted water could pass contaminants on to their babies. Another important finding was that water insecurity meant moms fed their babies in suboptimal ways: "At six months of age, the WHO recommends introducing complementary foods because a baby's nutritional needs are changing. In particular, infants need nutrient-dense foods at this age since they eat such small quantities," explained Schuster. Water insecurity hinders the ability to grow nutritious fruits and vegetables and limits cooking in terms of the longer boiling times needed to make foods palatable to infants. Unable to eat preferred foods, there is potential that infants may be missing necessary nutrients during this important period of their development.

Senior study author Dr. Sera Lewise Young, a nutritional anthropologist at Northwestern University, got the idea for this body of work during her previous study of food insecurity in Kenya. Young gave moms cameras and asked them to take pictures of what is important when feeding their kids. "And I got back photos of what you might expect: failed crops and sick chickens and drunken husbands drinking up the food money, but then there were all these pictures of water," said Young. Some showed how they had to leave their babies with neighbors while they went to queue for water, which prevented exclusive breastfeeding. One memorable image showed a jug of murky water taken from a river into which sewage from a prison was dumped. The woman who took the shot explained: "This is a picture of the water I use for my child. I can either buy food and use this water or I can buy water and have no money for food."

Having seen through other mothers' eyes, Young knew she needed to quantify water insecurity. She worked with a consortium of global collaborators to develop the first validated, cross-culturally equivalent tool to assess water insecurity at the household level based on data from 28 LMICs. The resulting tool, the Household Water Insecurity Experiences Scale (HWISE), has been adopted by the World Bank, UNICEF and others, Young reported. "Organizations are recognizing that the measurement of experiences of water insecurity is as important as measuring food insecurity."

The studies mentioned above were funded in part by the NIH's National Institute of Environmental Health Sciences, the National Institute of Mental Health and Fogarty.

OPINION

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

Observing four decades of progress on HIV/AIDS

This summer marks 40 years since the CDC officially reported the first cases of the disease that came to be known as HIV/AIDS. Originally an almost certain death sentence, HIV is now largely a manageable chronic illness, thanks to global research efforts including those conducted and supported by NIH.

By the mid-1980s, HIV had begun to take hold in sub-Saharan Africa and other low- and middle-income countries (LMICs) with few resources to combat it. This growing need was a topic of discussion at the 3rd International AIDS Conference, held in Washington in 1987. Scientists recognized that research into this mysterious new disease was badly needed, not only in the developed world, but also in countries with different experiences in transmission, testing and patient care. But there was an enormous barrier—the lack of research capacity in areas most severely hit by the epidemic.

Fogarty's Dr. Ken Bridbord, co-convenor of the conference, quickly sketched out ideas for a new initiative. The following year the Center launched the AIDS International Training and Research Program, known as AITRP, which provided significant research training to more than 2,000 individuals from at least 100 LMICs.

This approach was groundbreaking and helped to build the level of expertise necessary for sustained research efforts to study the HIV/AIDS epidemic on the ground in the locations where suffering was greatest. Under the program, trainees from developing countries were selected to come to U.S. grantee institutions to learn from experts and work in well-equipped laboratories. Training courses were short- or long-term and covered many different levels and topics, including master's and doctoral degrees, laboratory skills, proposal and paper writing, epidemiology, biostatistics, ethics and HIV/AIDS related biology. AITRP offered an unusual degree of flexibility, allowing the grantees to adapt to changing conditions.

AITRP trainees, newly empowered with knowledge, experience, mentors and an established network of collaborators, returned home with increased confidence and the ability to help their countries craft and implement locally relevant strategies to tackle HIV/AIDS. This enabled them to work as equal scientific partners with their high-income country peers. The program also benefited U.S. institutions, as visiting trainees brought an added dimension to classroom discussions with their firsthand knowledge of conditions and needs.

At the start, AITRP awardees were immediate beneficiaries of NIH's considerable investments in AIDS research. Fogarty's research-capacity efforts laid the groundwork for other NIH investments and AITRP alumni became the major foreign collaborators on numerous NIH-supported research projects.

With proof of concept, Fogarty transformed its entire extramural portfolio to focus on building core foundational capacity through research training programs in bioethics, genetics, informatics, stigma, and health and economic development. To meet changing needs, Fogarty consolidated AITRP with an implementation research training effort to form the Fogarty HIV Research Training Program, which continues today.

Fogarty trainees contributed to scientific advances by helping to provide evidence that male circumcision and screening of the blood supply reduced HIV transmission; data that demonstrated the effectiveness of treatment as prevention; and confirmation that people living with HIV in low-resource settings could follow complex ART regimens.

Along the way, Fogarty has relied on NIH partners for support and expertise, including the Office of AIDS Research; *Eunice Kennedy Shriver* National Institute of Child Health and Human Development; National Cancer Institute; National Heart, Lung and Blood Institute; National Institute on Alcohol Abuse and Alcoholism; National Institute of Allergy and Infectious Diseases; National Institute of Dental and Craniofacial Research; National Institute on Drug Abuse; National Institute of Mental Health; National Institute of Nursing Research; and the NIH Offices of Dietary Supplements and Research on Women's Health.

Today, the research priorities have shifted toward treating HIV as a chronic disease, dealing with co-infections and studying the long-term effects of antiretroviral treatment. Although much has been accomplished, we remain firmly committed to this battle. It's time to end the HIV epidemic, both at home and abroad.

RESOURCES

http://bit.ly/40-years-hiv-aids

PEOPLE

Power confirmed as USAID administrator

Ambassador Samantha Power was sworn in as USAID administrator in early May. Power previously served as U.S. Ambassador to the United Nations and as Senior Director for Human Rights and Multilateral Affairs on President Obama's National Security Council. President Biden has elevated the USAID role to include a seat on the NSC.

Smith to helm Biden's COVID-19 vaccine diplomacy

Gayle Smith has been tapped to lead the U.S. vaccine diplomacy efforts to ensure COVID-19 vaccines are distributed equitably around the globe. Smith—who served as USAID administrator in the Obama administration—had been leading the ONE Campaign to eradicate poverty and preventable disease.

NINDS Director Koroshetz honored by UChicago

The University of Chicago Pritzker School of Medicine has recognized Dr. Walter Koroshetz, director of NIH's National Institute of Neurological Disorders and Stroke, with its distinguished alumni award. Koroshetz joined NINDS in 2007 and became director in 2015. Previously, he pioneered acute endovascular clot removal for stroke, which is now standard treatment.

Cubillos to lead global mental health research at NIH

The NIH's National Institute of Mental Health has announced Dr. Leonardo Cubillos will lead its Center for Global Mental Health Research. A psychiatrist, Cubillos earned his M.D. at Universidad Del Rosario in Colombia. Previously, he was senior health specialist at the World Bank and has also held several positions in Colombia's health ministry.

South African bioengineer Douglas dies

Fogarty collaborator Dr. Tania Douglas has died of cancer. The University of Cape Town professor was editor of the first textbook on biomedical engineering in Africa, written by African authors and produced through a Fogarty grant. In 2019, Douglas received the South African Women in Science Award.

Fogarty grantee King receives Gairdner Award

University of Washington professor Dr. Mary-Claire King has been honored with the 2021 Canada Gairdner International Award for transforming cancer genetics and oncology with her discovery of inherited susceptibility to breast cancer due to mutation of the BRCA1 gene. King has been a Fogarty grantee and has served on the Center's advisory board.

Global HEALTH Briefs

NCI issues plan for global health research

The NIH's National Cancer Institute has released the five-year plan for activities of its Center for Global Health. Areas of scientific focus include new technologies, implementation science, cancer health disparities, clinical trials and cancer etiology. Each area requires CGH to leverage expertise and resources from across NCI.
Full plan: http://bit.ly/NCIglobalplan

WHO develops research guidance

The WHO has announced new guidance for research on genetically modified mosquitoes, addressing issues relating to ethics, safety, affordability and effectiveness. The recommendations were developed with TDR, the Special Programme for Research and Training in Tropical Diseases, and GeneConvene, an initiative of the Foundation for the National Institutes of Health.
News release: http://bit.ly/WHOmosquitoes

Scientists create virus database

Researchers who study pathogens that travel from animals to humans have created a database of nearly 1,000 viruses in preparation for the next pandemic. SpillOver is an open-source tool designed to rank viruses based on their risk of spreading to people.
Website: https://spillover.global/

GACD launches case study collection

The Global Alliance for Chronic Diseases has posted online a group of case studies relevant to different stages of implementation research of noncommunicable disease prevention and control policies, programs and strategies. The project examples include situational analyses, implementation research activities, scale-up guidance and economic evaluation.
Website: http://bit.ly/GACDcasestudies

2020 G-FINDER report on R&D released

The latest data on global investments in neglected disease research and development have been released in the annual G-FINDER report. The 2020 study's trend analysis includes the impact of COVID-19-related changes in survey participation.
Full report: www.policycuresresearch.org/analysis/

Funding Opportunity Announcement	Deadline	Details
International Bioethics Training R25 Clinical Trial Not Allowed D43 Clinical Trial Optional	Jun 4, 2021	http://bit.ly/BioethicsTraining
Hubs of Interdisciplinary Research and Training in Global Environmental and Occupational Health (GEOHealth) U01 Research Project Cooperative Agreements U2R International Research Training Cooperative Agreements	Jul 8, 2021	http://bit.ly/geohealthhubs
Launching Future Leaders in Global Health Research Training D43 Clinical Trial Optional	Aug 2, 2021	http://bit.ly/launch-future-leaders
Global Infectious Disease (GID) Research Training D43 Clinical Trials Optional	Aug 3, 2021	http://bit.ly/IDtraining
Chronic, Noncommunicable Diseases and Disorders Research Training D43 Clinical Trial Optional	Aug 13, 2021	http://bit.ly/NCDtrain
Fogarty HIV Research Training for LMIC Institutions D43 Clinical Trial Optional D71 Clinical Trial Not Allowed G11 Clinical Trial Not Allowed	Aug 20, 2021	http://bit.ly/NIHGlobalHIV
Ecology and Evolution of Infectious Diseases (EEID)	Nov 17, 2021	http://bit.ly/EEIDNIH

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

Global Health Matters

May/June 2021

Volume 20, No. 3 ISSN: 1938-5935

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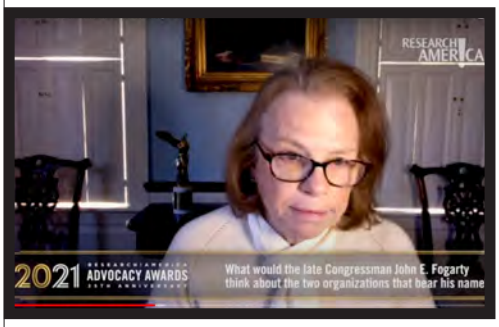
Research!America recognizes Mary Fogarty McAndrew



In its first virtual advocacy awards ceremony, *Research!America* recognized the contributions of many supporters, including advocate Mary Fogarty McAndrew, who received the 2020 Gordon and Llura Gund Leadership Award for her contributions in advancing global health science and improving the lives of those with intellectual and developmental disabilities (IDD).

Fogarty McAndrew is the daughter of Congressman John E. Fogarty, the namesake of both the Fogarty International Center at NIH and a foundation devoted to providing services for those with IDD, headquartered in Providence, Rhode Island. In a panel discussion during the program, Fogarty McAndrew recalled her father's wish that there be a center at NIH that was laser-focused on global health. After his untimely death in 1967, she said his colleagues did just that.

"COVID-19 has taught us that making strategic investments in research and training and pandemic preparedness can save lives and lessen the impact of future disease outbreaks," Fogarty McAndrew observed. "There are numerous former Fogarty trainees in laboratories and health ministries across Africa, Asia and Latin America. They are mobilizing teams to track the spread of coronavirus and its mutations, and are studying treatments and vaccines."

Congressman Fogarty would approve of the contributions of both entities that bear his name, she added. "My father would be very happy with the way these organizations are making a difference at home and around the world."

RESOURCES

http://bit.ly/AdvocacyAwards2021