PIVOT

Adapting to New Challenges in Global Health

2019-2020 IMPACT REPORT



Duke GLOBAL HEALTH

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From the Director

Global health researchers understand the importance of flexibility. In the field, any number of things can go wrong, foiling best-laid plans. One must always be ready to shift gears and adapt to new realities.

This year like no other has tested the ability of the global health community to respond to the moment. When the novel coronavirus emerged in December 2019, it triggered urgent new questions: How dangerous is it? How can it be controlled? How do we protect people from its potentially deadly effects? Across our institute, dozens of scientists responded, putting their own research aside to join the global hunt for answers.

While COVID-19 has had a profound impact on all of our missions, it is not the only example of how a dramatic shift in conditions can reshape our work. Global health faces many such pressures, including the rapidly shifting demographics of low- and middleincome countries, changing patterns in disease burdens, the role of technology and innovation, and the existential threat of climate change.

In this report, you will read about several researchers and students who are confronting these challenges. As the title suggests, each of these people is leading an important pivot in global health, either by shifting their own research or by influencing others to adapt to new demands and realities. You'll also meet a group of extraordinary students who are fostering a pivot in global health



education itself, one that ensures we live up to our commitment to ethical engagement with communities around the world.

These individuals exemplify an approach that is fundamental to our impact. They bring not just deep knowledge of their discipline, but the humility to understand when conditions necessitate a new approach. In short, they expect the unexpected, and thus they are wellequipped to lead us confidently toward uncertain horizons.

Dennis A. Clements III

Interim Director, Duke Global Health Institute

Answering the World's Urgent Call

When a group of Duke business school students tested positive for COVID-19 in March 2020, Chris Woods saw an opportunity.

The students, who were infected on an overseas study program, were among the first people at Duke to contract the novel coronavirus, which was spreading uncontrollably across the globe. Researchers across Duke had shifted their labs to study the virus, but much was still unknown about its effects.

So Woods donned protective equipment and set up a drive-through clinic to collect nasal swabs from the students, most of whom had mild or no symptoms. Those samples – along with data Woods gathered from other early patients – became critical clues in an urgent search for answers.

"We shared special samples, blood cell subsets and serum samples to help other researchers further develop their diagnostic assays, as well as to create vaccines and therapies," says Woods.

A medical microbiologist who spent his early career with the U.S. Centers for Disease Control and Prevention. Woods knows the importance of discovery in an unfolding health crisis. He was on the front lines of the Ebola outbreak in West Africa and has developed diagnostic tools that can spot strains of flu two days before symptoms arise.

With COVID-19, Woods is again searching for early warning, studying the body's first molecular responses to the virus for a telltale sign of infection. He hopes this research will lead to simpler ways of diagnosing infection in people who have no symptoms – the so-called "silent spreaders" who have made COVID-19 so challenging to contain.

At the same time, Woods is trading data and ideas with a growing network of researchers who have been working around the clock since the virus emerged. This includes efforts to detect new viral threats in nature, to devise more effective control measures, and to develop novel therapies and vaccines.

"Everyone is all on board with trying to pursue knowledge here," he says.

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studying the body's first molecular responses to the virus for a telltale sign of infection.

Chris Woods



Engineering a Revolution in Women's Health

Many of the barriers that prevent women in low-income countries from seeking cervical cancer screening and care are tangible. Costs may be too high, or the clinic too far away. But the hardest obstacles to overcome are often invisible, fed by the shame and stigma many women feel about their reproductive health.

But what if cervical cancer prevention were designed around those women, rather than providers or health systems? That's the bold idea behind Women-Inspired Strategies for Health (WISH), a project launched this year by DGHI professors Nimmi Ramanujam and Megan Huchko, along with their global collaborators.

"Just like with the birth control pill or the pregnancy test, there is an opportunity to allow women to reframe the solutions in their own terms," says Ramanujam, a biomedical engineer who directs Duke's Center for Global Women's Health Technologies.

At the center of the WISH project are a pair of new tools designed by Ramanujam's team, both of which offer promising alternatives to cumbersome and expensive colposcopes used in most cervical exams. One version is so simple women could use it to examine themselves at home, which Ramanujam says could greatly increase screening rates in low- and middle-income countries, where about 85 percent of cervical cancer deaths occur. Ramanujam and Huchko are planning to scale up the technology in Peru and Kenya, where Huchko's team at the Center for Global Reproductive Health has established the first screening site in the country's rural western region. The project's promise was recognized by the John D. and Catherine T. MacArthur Foundation, which chose it as one of

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the top 100 ideas in the 100&Change competition to solve a critical global social challenge.

At the same time, the researchers are aiming for the project to spark a revolution in the design of the technology central to women's health – tools that, as Ramanujam notes, have mostly been designed by men. "We also hope that this process will spur greater demand and interest in technologies designed by women who best understand the needs of other women," she says.

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Preparing Health Systems for a Critical Transition

In Ghana, the growing wealth of citizens is hailed as a sign of progress. But the country's economic success is also bringing on new threats to public health.

It's a challenge faced by many historically low-income countries. As average incomes rise, they lose eligibility for various forms of health-related aid. If the country's own health system isn't prepared to fill the gaps, hard-earned health gains can be lost, and vaccinepreventable diseases such as malaria and AIDS can come roaring back.

His focus is on **big-picture dynamics** that will change the nature of problems healthcare workers may have to confront.

Osondu Ogbuoji, deputy director of DGHI's Center for Policy Impact in Global Health, is part of a team trying to keep that from happening. He is leading a project funded by the Bill & Melinda Gates Foundation that focuses on six countries – Ghana, Sri Lanka, Kenya, Nigeria, India and Myanmar – that are facing such transitions. The center is working alongside incountry policymakers to design and implement new approaches to health policy, financing and service that can help them navigate the path away from donor funding.

Ogbuoji began his career as a physician in his native Nigeria, but he was dogged by the feeling that simple policy changes could do so much more to expand access to healthcare. While working on policy may not provide the immediate gratification of providing hands-on care, he hasn't regretted shifting gears. "You know it's going to have long-lasting effects," he says.

Now his focus is on big-picture dynamics that will change the nature of problems healthcare workers may have to confront. All six countries in the study are experiencing changes in disease patterns, with higher rates of non-communicable diseases like diabetes and high blood pressure. Most have large adolescent populations, but are also seeing increases in elderly and immigrant communities.

For policymakers in Ghana, these factors all point toward complex questions: How does the health service need to adapt, and importantly, "what's the bill the government should be ready to pick up?" asks Ogbuoji. Helping countries answer these questions, he says, is a critical step toward navigating the transition to self-sufficiency.



Andrea, Laura and Yadu have pushed us to reflect on what more we can do to **dismantle structural barriers** in our work.

Putting Decolonization on the Agenda

In fall 2018, three students who had just started the Master of Science in Global Health program found themselves talking in a lounge in Duke's Trent Hall. Each had lived and worked in a different part of the world before coming to Duke, and as they shared their experiences, they voiced a common critique: Too often, global health agendas were dictated by wealthy countries, and not the communities they purport to help.

For Andrea Koris, Laura Mkumba and Yadurshini Raveendran, that first meeting grew into a mission. As Raveendran puts it, they wanted "to create a safe space for us and our peers to continue the conversation."

After connecting with similarly focused students at Harvard, the University of Michigan and the University of California at Berkeley, the three formed a working group to examine the complicated colonial legacy of global health and how it continues to be influenced by its historical power structures.

The students began planning a half-day conference, which featured speakers from the World Health Organization, BMJ Global Health, and several universities and NGOs. A maximum-capacity crowd of 250 attended in person, with another 500 tuned in online.

Gavin Yamey, a professor of the practice of policy and global health, describes the event as "one of the most important conferences I've ever attended – one that shone a spotlight on how global health can perpetuate oppression unless it reflects critically on its own colonial foundations.

At the same time, the working group developed recommendations for acknowledging global health's colonial roots in the classroom, as well as increased training in cultural competency for faculty, staff and students. And while Koris, Mkumba and Raveendran all graduated in May, they have inspired others to continue to push for progress.

When international protests against police violence and racism erupted in June, more than 100 current Duke students and alumni – led by Melissa Manus, Sreeja Kalapurakkel, Hiwot Zewdie, Paige O'Leary and Tra Tran – signed a letter urging DGHI to accelerate it's anti-racism efforts. The institute has appointed a task force to implement recommendations made by the working group.

The students' work has also inspired conferences at the University of Edinburgh and the Karolinska Institute in Sweden. DGHI recognized Koris, Mkumba and Raveendran with an award for global health leadership in May.

"Andrea, Laura and Yadu have pushed us to reflect on what more we can do to dismantle structural barriers in our work," says Mary Story, DGHI's associate director for academic programs. "Their leadership in putting these issues on the agenda – not just for us, but for global health more generally – will have a long-lasting legacy."

Gaining Global Perspective on Medical Research

Just three months before a novel virus brought the world to a standstill, Amanda Farrell took in the chaotic cacophony of a live bird market in Hanoi, Vietnam, and worried about that exact scenario.

"Large markets like that can be breeding grounds for infectious diseases that end up harming people," says Farrell, a Duke medical student who was in Vietnam as part of a research project on emerging zoonotic diseases. "We saw that with COVID-19, and it shows why we have to be out there doing surveillance."

The opportunity to spend a year doing research is a unique facet of medical education at Duke, and for students like Farrell, it provides a route to gaining hands-on experience in global health. That's important to Farrell, who was born on the Caribbean island of St. Vincent. When she was fifteen, a family member on the island died from an illness, and she wondered why the health system had failed to save her. "I knew then that I wanted to rectify that situation, no matter what career I chose," she says.

During her second year of medical school, Farrell contacted DGHI about its global research program for medical students. She met with DGHI professor Gregory Gray, who was doing work throughout Southeast Asia to track and study emerging animal-borne diseases. "We were trying to find evidence for novel influenza A and D viruses among swine herds in Vietnam," says Gray. "Sometimes such novel viruses infect humans. If we found such novel viruses it could have led to new understandings regarding their risk of zoonotic infections."

Farrell's research did not detect influenza D in animals or farm workers, but in biosurveillance, negative results can be just as important as positive ones. The most lasting effect of her work, though, may be on her perspective.

> The opportunity to spend a year doing research is a unique facet of medical education at Duke, and for students like Farrell, it provides a route to **gaining hands-on experience** in global health.

Living and working in an unfamiliar culture "takes you out of your element. You've had to build connections from the ground up and bridge gaps to create a collaborative space," she says. "You have to learn to be humble. And I think that's the most empowering part of global health."

Amanda Farrell

Dute Univers School of Medk

Primary Care Leadership Track

Joy Noel Baumgartner Č

Empowering Families Where Mental Health Resources are Scarce

In Tanzania, families who care for loved ones with mental illnesses may feel they quite literally have no place to turn. There are just three mental health providers for every 1 million residents, making professional intervention for mental health disorders rare or even impossible.

"The reality is that it's families who are providing most of the care," says Joy Noel Baumgartner, an associate professor of global health who leads DGHI's mental health research group.

But in some low-resource settings, necessity is seeding innovation. Recognizing that giant gaps in mental health access aren't going away any time soon, Baumgartner and other mental health researchers are increasingly testing interventions that rely more on families and trusted allies of people with mental disorders.

In one such study, Baumgartner and colleagues at Tanzania's Muhimbili University of Health and Allied Sciences are providing psychosocial education to caregivers of adults with schizophrenia. Caregivers and their family members attend sessions to learn about the disorder, dealing with stigma, how to recognize symptoms of acute episodes, and how to set positive goals for recovery.

"We had people in the study who have not been functional in many years," says Praxeda Swai, a medical specialist at Muhimbili National Hospital who helped run the psychoeducation program. "But within a few weeks, almost all had really changed in a lot of aspects of their recovery."

Similar experiments are underway in South Africa, where DGHI assistant professor Lauren Franz is training caregivers of children with autism spectrum disorder in evidence-based techniques to improve social engagement. And in Kenya, Eve Puffer, an assistant professor of global health and clinical psychologist, is teaching village elders to use family therapy with community members who have experienced intimate partner violence. Other studies are helping family members and peers intervene in cases of depression and anxiety.

There is significant evidence that **family and peer support is effective** wherever it is applied, even in countries with more mental health resources.

But scarcity isn't the only reason to welcome more family-based interventions in mental health. Baumgartner notes that there is significant evidence that family and peer support is effective wherever it is applied, even in countries with more mental health resources.

Mining Data to Improve Access to Health Care

When you study a map of pediatric surgery access in Brazil, a disconnect quickly emerges from the data. The country has an extensive public health system, including hospitals that provide surgical care. But those resources aren't always in the right places.

"There are vast areas where it's very hard to reach a hospital," says João Ricardo Vissoci, an assistant professor of surgery and global health. "It's not necessarily that you don't have the means to travel to the hospital, it's just very hard to get there."

Data alone won't solve such issues, but the study illustrates the **power of geospatial** analysis to draw attention to big-picture needs and disconnects in the deployment of health resources.

For low- and middle-income countries such as Brazil, it can be a challenge for policymakers to ensure their countries' limited healthcare resources are deployed efficiently. Geospatial analysis has emerged as one tool to provide highlevel assessment of gaps and disparities in care, signaling mismatches between infrastructure, healthcare workforce, and need.

And that's exactly what Vissoci is doing, starting with his native country. In 2019, he crunched data on more than 250,000 surgical procedures across 5,000 Brazilian municipalities to produce one of the first countrywide analyses of pediatric surgical care. Among the truths revealed by the study's data-rich maps is that surgical resources aren't nearly as accessible in Brazil's more remote northern regions as they are elsewhere.

Data alone won't solve such issues, but the study illustrates the power of geospatial analysis to draw attention to big-picture needs and disconnects in the deployment of health resources. Vissoci has done similar research on the incidence of traumatic brain injuries and access to mental health care in Tanzania and Uganda.

"What this work says — and it's part of a growing movement worldwide — is that if we use national data sets and refine tools the way that João and his team are doing, we can apply what we learn around the world," says Henry Rice, DGHI professor of surgery and co-author of the Brazil study. "It's taking what resources you have available and applying them most efficiently."

2019-2020 Highlights

Education

The **COVID-19 pandemic** created an obstacle for dozens of global health students who planned to conduct field research during the summer of 2020. With travel restricted in most parts of the world, DGHI's education team scrambled to find ways for students to participate in research projects remotely. Many students were able to work with faculty and global partners to analyze secondary data, and several participated in local projects related to COVID-19.

Among the many DGHI courses that pivoted to focus on the pandemic was Professor Gavin Yamey's **global health policy class**, which partnered with RTI International, an independent, nonprofit research institute, to propose

DGHI professors scrambled to provide virtual classrooms for students during the pandemic.

and develop policy solutions related to controlling COVID-19 outbreaks in lowand middle-income countries. Students formed groups that worked with RTI mentors to address the pandemic from the perspective of a specific country, devising policy and system recommendations for controlling the unfolding spread of the virus.

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Despite travel restrictions, 52 students participated in independent global health research during summer 2020, working with partners in 14 countries

Led by neurosurgery professors Tony Fuller and Michael Haglund, the **Duke Division of Global Neurosurgery and Neurology** completed a research project that helped improve post-surgical outcomes for patients in Uganda's Mulago Hospital. Students with a Duke Bass Connections team worked with hospital staff to design and test simple protocols, such as an informational video, to educate caregivers on effective ways to prevent infection and support the healthy recovery of patients after surgery.

Enrolling in fall 2019, Deepti Agnihotri and Vincenzo Malo were the first students in DGHI's **Accelerated Master of Science in Global Health** program, which allows highly motivated undergraduates majoring or minoring in global health to work toward an MS degree while

Deepti Agnihotri and Vincenzo Malo are the first students in DGHI's accelerated master's program. finishing their undergraduate studies. Students in the program can complete their undergraduate and MS degrees in five years, a year less than the traditional timeframe.

Professor Janet Bettger's Bass Connections team launched **Help Desk**, a project designed to support Durham's Lincoln Community Health Center integrate social care with health care. For the project, Duke students connect patients with social services and community resources — such as food pantries, affordable housing and job resources.

Research

At least 45 DGHI faculty were directly involved in **COVID-19 research projects** or had pivoted existing projects to focus on aspects of the pandemic. To further encourage such research, DGHI awarded pilot grants to five teams working on

A Duke researcher collects cells from a COVID-19 patient to study immune response to the disease.

pandemic-related research, including a project led by the Center for Policy Impact in Global Health to identify policies to ensure efficient and equitable allocation of COVID-19 vaccines; two projects to create a global network to discover and detect novel viruses infecting humans; and two projects seeking to document and address the mental health burdens created by the pandemic.

DGHI convened a working group on **global health applications of artificial intelligence** (AI) to discuss the institute's current and future research capacities related to AI and machine learning. Led by Wendy Prudhomme-O'Meara, DGHI's associate director for research, the group brings together researchers from across Duke to discuss ways to align DGHI's interests in AI and big data with Duke's strategic priorities. In particular, members are focused on the question of how to use AI to address global health disparities.

The Center for Health Policy and Inequalities Research launched the **Duke Sexual and Gender Minority Health Program** to spark and support research on the health disparities experienced by sexual and gender minorities locally and globally. The program seeks to coalesce interdisciplinary resources across Duke to bring more focused attention on often-overlooked and under-researched gaps in health access, care and outcomes for these vulnerable populations.

> **45** DGHI faculty who were directly involved in research projects exploring COVID-19 and issues related to the global pandemic.

DGHI's Evidence Lab and the Global Health Innovation Center concluded a two-year evaluation of innovations funded by Saving Lives at Birth, a program launched by the U.S. Agency of International Development to spark new ideas to combat maternal and child deaths in low- and middle-income countries. The research found the program succeeded in fueling early-stage innovation and brought new innovators into the field of maternal and neonatal health. The report encouraged more participation from innovators in low- and middle-income countries and buy-in from local stakeholders.

Duke professor of global environmental health William Pan co-authored a series of studies conducted by researchers in the Madre De Dios region of Peru. The papers found that **small-scale gold mining** in the Peruvian Amazon poses

A Duke researcher leads Peruvian children in a psychological assessment as part of a study of the health effects of mercury contamination.

neurotoxic health hazards from mercury exposure not only to miners but also to people living in nearby communities even those living hundreds of kilometers away.

Megan Huchko, director of the Center for Global Reproductive Health, is working in partnership with the Ministries of Health in central Uganda and western Kenya to evaluate the best ways to implement **HPV-based cervical cancer screening** in rural areas, especially where women have limited access to reproductive healthcare. Huchko's research has influenced Kenya's official guidelines and practices on HPV screening.

Lauren Franz, assistant professor of psychiatry and global health, led a pilot study in South Africa that demonstrates the potential effectiveness of caregiver intervention for **children with autism spectrum disorder**. In the study, supported by the National Institutes of Mental Health, clinical psychologists at the University of Cape Town trained caregivers in an evidence-based early intervention model that emphasized strategies to nurture development of social and communication skills.

Duke professors Neil Prose and Ray Barfield produced a documentary called **"Keepers of the House"** about the important ways that hospital housekeepers participate in patient care. Featuring interviews with Duke Health hospital cleaning staff, the short film highlights the fact that housekeepers often spend more time with patients than doctors do.

Policy and Analysis

Global decisionmakers have sought advice and input from DGHI's policy experts to identify the most effective strategies for **managing the COVID-19 pandemic**. DGHI's Center for Policy Impact in Global Health, for example, has been working with the World Bank, the World Health Organization and the U.S. National Academy of Medicine to analyze the most efficient ways of financing and distributing COVID-19 vaccines, among other issues. DGHI deputy director Shenglan Tang produced for the World Bank a review of best practices and policy responses among several countries that successfully managed the virus outbreak.

Healthy Eating Research, a national program of the Robert Wood Johnson Foundation, directed by DGHI professor Mary Story, published landmark new guidelines on what beverages are healthy for infants and young children. The recommendations are based on scientific research and endorsed by the American Academy of Pediatrics, the Academy of Nutrition and Dietetics, the American Academy of Pediatric Dentists and the American Heart Association. The guidelines include suggestions for avoiding sugary drinks and promoting water.

Manoj Mohanan, associate professor of public policy and global health, conducted a study in rural India that shows that a **system of social accountability** can lead to significant improvements in key maternal and child health outcomes. The researchers found that a combination of providing information and engaging the community led to significant improvements in full immunization rates among young children and higher institutional deliveries among pregnant women.

Partnerships

As part of DGHI's efforts to bring new focus to research and training partnerships closer to home, associate professor Sumi Ariely took on a new role within DGHI to coordinate local DGHI research and student training programs. Ariely helped DGHI launch two student research training programs in Durham: one at Triangle Residential Options for

Global health students Gabrielle Zegers, Ashley Wilson and Rachel Baber participated in a research project with Durham service organization TROSA.

Substance Abusers, Inc., (TROSA), a residential substance abuse treatment and recovery program, and one at Bull City Fit, a community-based wellness and obesity prevention program.

In November 2019, DGHI hosted its **first executive education workshop** for Chinese government officials. The weeklong course was attended by 24 senior officials from departments within the National Health Commission, Chinese Centers for Disease Control and General Office of State Council.

DGHI hosted 16 **visiting scholars** in the first eight months of the 2019-20 academic year, up from 13 in all of 2018-19. Before the pandemic limited travel, DGHI had plans to host another 16 visiting scholars during spring and summer of 2020, which would have been the largest number of visiting scholars hosted by the institute.

> **16** — Visiting scholars hosted by DGHI in 2019-2020, up from 13 in 2018-19

Facts & Figures

Category	2019-2020 Funding	
Sponsored Projects	\$18,231,073	
University Support	\$6,938,476	
Gifts and Endowme	nt \$2,523,618	
Tuition and Fees	\$3,509,692	
Total	\$31,202,859	

Faculty

Core faculty	93
Affiliate faculty	63
Adjunct faculty	10
Total faculty	166
Staff (including centers)	111

Interdisciplinary Faculty DGHI includes faculty from 8 Duke schools

Research

In FY20, DGHI faculty and affiliates received 251 external research grants *(including new and renewed grants)* with annual funding of more than \$121 million.

DGHI Annual Research Expenditures

2019-2020	
Federal	\$11,534,433
Non-Federal	\$6,696,639
Total:	\$18,231,072

Note: Graph includes only grants administered by DGHI and not those administered by other Duke schools.

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Where We Work

DGHI's Global Partnerships and Projects

Faculty Projects StrategicPartnerships Student Projects (10 countries) (33 countries) (17 countries) China Bolivia Mozambique Brazil China India Brazil Myanmar Cambodia Ghana Kenya Nepal Peru China Honduras Nicaragua Singapore Ecuador Nigeria India South Africa Egypt Pakistan Jordan Sri Lanka

Sri Lanka Tanzania Uganda United States *(Durham, N.C.)* Bolivia Brazil Cambodia China Ecuador Egypt El Salvador Ethiopia Ghana Guatemala India Jamaica Kenya Madagascar Malaysia Mali Mexico Mozambique Myanmar Nepal Nicaragua Nigeria Pakistan Peru Singapore South Africa Sri Lanka Tanzania Uganda United Kingdom United States Vietnam Zimbabwe Brazil China Ghana Honduras India Jordan Kenya Madagascar Malaysia Myanmar Nepal Peru Sri Lanka Tanzania Uganda United States Zimbabwe

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