



CHIEF> **PAUL FARMER, M.D., PH.D.** (2003–2005, 2009–PRESENT)

Division of

GLOBAL HEALTH EQUITY

The Division of Global Health Equity is committed to strengthening healthcare delivery, training, and research, to reduce disparities in disease burden, and to improve treatment outcomes for the most needy, both domestically and abroad. Established in 2001, the division works in close collaboration with the nonprofit Partners In Health (PIH) and the Department of Global Health and Social Medicine at Harvard Medical School (HMS). Recognizing the complex social determinants of health, division faculty aim to reduce health disparities by undertaking essential research using insights from anthropology, history, sociology, epidemiology, statistics, economics, and other social sciences, to improve medical care in the world's poorest areas. The division focuses on infectious diseases like human immunodeficiency virus (HIV), tuberculosis, and Ebola virus disease (EVD), as well as non-infectious diseases such as coronary artery disease, diabetes, addiction, and critical health delivery problems.

STRENGTHENING HEALTH SYSTEMS

Under the leadership of Division Chief Dr. Paul Farmer, the division fosters the work of faculty committed to meeting the needs of populations in the world's poorest areas, to practice medicine, and to strengthen health systems through partnerships and collaborations. Domestic and international efforts engage division faculty and their global counterparts to achieve these goals.

Domestic Initiatives

Anansi Health

Anansi Health was launched in January 2014 as a collaboration between Dr. Heidi Behforouz (a division faculty member) and Dr. Clemens Hong (a primary care physician and implementation scientist). Dr. Behforouz previously led the Prevention and Access to Care and Treatment (PACT) project, which provided care through a community health model in the Dorchester neighborhood of Boston. Building on their community health experience, Drs. Behforouz and Hong developed Anansi Health to provide training, consulting, and direct service operations for community-based complex care management for vulnerable populations. By leveraging community health workers (CHWs) and integrating them within healthcare delivery teams, Anansi Health aims to transform health delivery through community engagement and to improve health for high-risk and high-need individuals in the U.S.

Navajo Nation

The Community Outreach and Patient Empowerment (COPE) project is a formal collaboration between the division, the Navajo Nation Community Health Representative (CHR) Outreach Program, and the Navajo Area Indian Health Services, committed to eliminating health disparities and improving the wellbeing of American Indians and Alaska Natives. Led by Dr. Sonya Shin, COPE is based in Navajo Nation where staff work in community partnerships on issues such as AIDS, cancer care, nutrition, and health system strengthening. COPE began in 2009 in the Gallup and Shiprock Service Units of Navajo Nation, in the four corners region of the Southwest, with funding from the Rx Foundation.

COPE supports the Navajo CHR Program by providing standardized training, developing culturally relevant health-promotion teaching materials, and strengthening the integration of CHWs into the healthcare delivery system. Navajo Nation CHRs, in turn, deliver intensive community-based outreach to promote healthy behavior changes among individuals with uncontrolled chronic health problems such as diabetes, hypertension, and heart disease. Given promising data on clinical improvements among participants in Gallup and Shiprock, COPE has now expanded to all eight regions of Navajo Nation. COPE is also exploring new programs, including: prevention efforts to reduce cardiovascular disease, cancer risk, and childhood obesity; an online training platform to offer training to CHRs in other tribes; and projects to increase access to healthy foods in Navajo Nation.



Dr. Cancedda collaborates with colleagues in Rwanda to strengthen the health system.

International Initiatives

Haiti

The Division of Global Health Equity, working with PIH, has a long history in Haiti. For over 25 years, the division has collaborated with Zanmi Lasante (ZL), one of the main healthcare providers in the country. ZL's mission is to increase access to health services for the poorest individuals and to improve the health and overall standard of living for residents of the country's rural central plateau. Today, ZL ranks as the main provider of healthcare for central Haiti and the only provider of comprehensive primary care, regardless of ability to pay. The number of patient visits to ZL's 12 sites has grown to 2.8 million annually. Many division faculty began their international work at ZL and continue to be closely involved in the project.

Another focus of division collaborative efforts in Haiti is the Hôpital Universitaire de Mirebalais (HUM). In partnership with Haiti's Ministry of Health, HMS, and other partners, division faculty work with PIH and ZL to provide care and medical education at the hospital in Mirebalais. HUM serves as a regional referral facility and teaching hospital that grew from the near-destruction of Haiti's main teaching hospital in Port-au-Prince in the devastating 2010 earthquake. The 300-bed hospital offers services never before available at a public hospital in Haiti, including computed tomography (CT) scans, advanced surgical care, and endoscopy. University Hospital has a 24-hour emergency department, a women's health clinic, general medicine clinic, infectious diseases clinic, and specialty clinics for orthopedic surgery, general surgery, non-communicable diseases (NCDs), mental health, internal medicine, pediatrics, urology, ear, nose, and throat (ENT), and oncology. Clinical services are supplemented by pharmacy, radiographic services, and clinical laboratories, and the hospital is staffed by over 800 people.

Liberia

Founded by division faculty member Dr. Raj Panjabi and other survivors of Liberia's civil war, Last Mile Health (LMH) is committed to saving lives in the world's most remote villages. Working in outlying jungle communities cut off from even basic health services, LMH is building a health system that reaches everyone – by bringing healthcare to villagers' doorsteps. LMH trains community members to be health practitioners for their villages and then connects them with rural health clinics to offer every person access to the care they deserve. These frontline health workers (FHWs) are able to prevent, diagnose, and treat the ten most life-threatening health conditions.

In light of the ongoing EVD epidemic in Liberia, LMH is rolling out infection prevention and control (IPC) mentorship and support services to each of the 18 health facilities in Grand Gedeh County, and will ensure a FHW is recruited, trained, and supported in every community within each facility's catchment area, a total of 264 communities and 400 FHWs. At the national level, LMH will be providing technical support to the Ministry of Health and Social Welfare (MOHSW) in Liberia to marshal a comprehensive EVD outbreak and transition response that strengthens the health system. Under the leadership of the MOHSW, and in coordination with other partners, LMH will support national plans to strengthen community health systems and help deploy FHWs in remote communities across Liberia. In addition, LMH is working with PIH to achieve universal access to critical EVD services as well as already lacking primary care in all of the counties in southeastern Liberia (including Grand Gedeh, Maryland, Grand Kru, Rivercess, River Gee, and Sinoe Counties). To date, PIH has committed to the staffing and management of multiple EVD Treatment Units (ETUs) in southeastern Liberia to serve as regional referral centers.

Lesotho

In 2006, building on extensive experience in Haiti and Rwanda, division faculty and PIH launched their second project in Africa, in the nation of Lesotho, in partnership with Lesotho's MOHSW. Division efforts in Lesotho, in collaboration with Partners in Health-Lesotho (PIH-L), focus on bringing HIV/AIDS care and treatment and other health and support services to poor, rural communities in remote mountain villages that are difficult to reach and have been largely neglected. Since 2009, the work has expanded to seven mountain clinics across four districts of Lesotho, serving over 120,000 people. Since the start of the project, PIH-L has tested and counseled over 125,000 people and made anti-retroviral drugs accessible for all HIV patients who need them.

In recent years, the project has focused increasingly on reducing the high rates of maternal and child mortality observed in these remote mountain communities offering community-based and fully integrated health services. In 2009, with support of division faculty, PIH-L began a project to increase services to pregnant women. In consultation with the villages, PIH-L has since selected and trained more than 600 women – many of whom are former traditional birth attendants – as clinic-affiliated maternal health workers, responsible for accompanying women in their villages to the health center for antenatal care, delivery services, postnatal care, and family planning services provided by a skilled nurse-midwife. In 2011, the project began active outreach to all villages in the catchment area to identify and enroll in services all children under age five. To date, more than 79,000 children have received immunizations as well as screening, testing, and treatment for malnutrition, HIV, and tuberculosis (TB).

In 2013, the government of Lesotho, impressed with the results of the PIH-L program, began working to develop a plan to scale up this model for care throughout the country. In particular, the goal of this model is to provide high-quality, accessible care to the most vulnerable (women and children) in the rural areas of Lesotho.

PIH-L is committed to supporting the Ministry of Health to implement National Health Reform through

the three-phased process over five years. The goal of the reform is to make significant progress in achieving millennium development goals (MDGs) 4, 5, and 6 in Lesotho, and to prove, with research, that even in a country with Lesotho's challenges, positive health outcomes can be achieved for the most vulnerable. Through PIH-L training for district health teams, frontline providers at the health centers, and village health workers (VHWs), we expect to see increased TB case notification and treatment success, increased adherence and retention for patients under HIV care and treatment, and increased facility-based childbirths and reduced maternal and neonatal mortality. To date, PIH-L has assisted in the training of over 6,000 VHWs in the four districts.

Madagascar

Division faculty member Dr. Michael Rich has established health system strengthening efforts in the Ifanadiana district of Madagascar through the global health non-governmental organization (NGO) PIVOT. The mission of PIVOT is to work in partnership with communities and to combine accessible and comprehensive healthcare delivery with rigorous scientific research to save lives and break cycles of poverty and disease. Under the leadership of Dr. Rich, PIVOT is providing an evidence-based, research-supported model health system for rural Madagascar. PIVOT collaborates directly with Madagascar's Ministry of Health to develop health centers, a district hospital, and community resources. PIVOT also engages in poverty-alleviation initiatives, conducts monitoring and evaluation of health system strengthening activities, and supports research.

Malawi

In January 2007, at the invitation of the Ministry of Health (MOH) in Malawi, division faculty and PIH began working in Neno, Malawi. Malawi is the world's fourth-poorest country and also has one of the world's highest mortality rates at 55 years of age. This country of 16 million has one of the world's highest prevalence rates of HIV/AIDS (11%). Malawians also have one of the highest ratios of maternal mortality globally - an estimated 680 maternal deaths per 100,000 live births.

Division faculty are committed to strengthening the health system and improving outcomes in Malawi. The Malawi project, called Abwenzi Pa Za Umoyo (APZU), has made significant progress in Neno since its launch. Within the first couple years, both a district hospital and a community hospital were constructed. Today, APZU supports healthcare delivery at these hospitals, as well as at 11 health centers serving the 144,000 people in the district. In 2013, the first-ever surgical suites were opened at both hospitals, and 232 caesarian sections have been performed since their opening in November 2013. In 2014, the hospital began operating the only publicly available oxygen plant in Malawi, and a 70-bed maternity ward is scheduled to open in early 2015. Additionally, early 2015 will see the opening of Dambe Health Center, a facility serving one of the most remote areas of Malawi. With the help of division faculty, APZU supports the MOH in running 13 HIV clinics, with over 6,000 HIV patients actively enrolled. The HIV program offers comprehensive treatment including nutritional support, socioeconomic support for the most vulnerable patients, and a network of 820 CHWs to provide accompaniment to all HIV patients. Due to the comprehensive and decentralized HIV program, the survival and retention numbers are some of the best in Malawi.

Given the strength of the HIV model, currently the APZU team is working with the Ministry of Health to integrate care for HIV and common non-communicable diseases, initiating an “integrated chronic care clinic” that will combine the current HIV, TB, chronic care, and palliative care clinics into one model for comprehensive primary care at all health facilities in Neno. Patients with Kaposi’s Sarcoma (KS) continue to receive chemotherapy and palliative care at Neno District Hospital, through an innovative program supported by the division and the Dana-Farber Cancer Institute, which is the only provider of second-line chemotherapy for KS in Malawi. In addition, APZU is shifting its CHW program to support broader health issues in the district. Kicking off this effort is a maternal health focus, and CHWs are currently being trained to work with pregnant women in the community and accompany them to health

facilities for prenatal care and delivery. Learning from Lesotho’s experience, this project is supported by the construction of maternal waiting homes at two health facilities. Finally, APZU is focusing on building the next generation of healthcare providers by developing Neno as a rural primary care training site. This year saw the first cohorts of Malawian medical students rotating in Neno for their family medicine electives. APZU looks forward to many exciting developments in 2015, including the opening of the new infrastructure projects, supporting the MOH in district strategic planning, integrating primary healthcare services, expanding the CHW program, and expanding programs in academic training and mentorship.

Mexico

In 2011, division faculty helped launch Partners in Health/Compañeros En Salud (PIH/CES), a sister organization of PIH. Under the leadership of division faculty member Dr. Daniel Palazuelos, PIH/CES supports rural government clinics in the Sierra Madre de Chiapas – one of the most marginalized regions in the state – to transform clinic performance and clinician education.

While Mexico’s health system has been celebrated for reaching near “universal coverage” by expanding government health insurance, accessing high-quality care remains elusive, especially for the rural poor. In partnership with local health jurisdictions, PIH/CES revitalizes underperforming rural clinics. PIH/CES-supported clinics provide high-quality healthcare to vulnerable people who previously had no reliable health services, despite eligibility for government health insurance. PIH/CES currently operates in six rural clinics and plans to expand to ten by 2015. By focusing on primary care, PIH/CES strives both to improve health outcomes, as well as to decrease the impoverishing costs of seeking healthcare outside the community.

PIH/CES is also a platform for Mexican and international medical trainees to learn about global health delivery and to conduct high-impact implementation research. PIH/CES provides Mexican social service physicians a career-defining training

experience so that they may be agents of change in creating a more equitable health system. They receive a monthly didactic certificate course in global health equity and bedside accompaniment with patient care, and are encouraged to envision new innovations or projects that will improve the quality of care delivered. The result has been a number of exciting home-grown initiatives such as an innovative electronic medical record system and enhanced community-outreach programs. The majority of the social service physicians who have graduated from this program to date have gone on to work in global health, either with PIH/CES as a supervisor or with other related groups. PIH/CES also offers elective rotations and in depth collaborations for international medical residents and attending physicians.

Nepal

Division faculty member Dr. Duncan Maru co-founded Possible Health, a nonprofit healthcare entity in rural Nepal that offers high-quality, low-cost healthcare integrating government hospitals, clinics, CHWs, and referral care. The organization's innovative public-private partnership leverages the Nepali government, external development partners, and philanthropic funds, to deliver durable healthcare to one of the poorest regions in South Asia.

Since its founding in 2008, Possible Health has treated over 222,000 patients. These patients walk an average of five hours to receive care and make less than \$200 U.S. per year. This past summer, a five-year contract was signed with the Nepali government so that Possible Health can continue delivering care within their infrastructure. The contract was accompanied by a \$1M U.S. matching agreement to expand their hospital to become Nepal's first rural teaching hospital.

Dr. Duncan Maru was recently awarded a five-year "high-risk high-reward" grant by the National Institutes of Health (NIH) to further develop an implementation research program through his healthcare systems design group. Global health equity residents Drs. Dan Schwarz and Ryan Schwarz, together with other research team members, have recently published a study on strengthening Nepal's

Female Health Volunteer Network. Additionally, Drs. Jessica Hawley and Varun Verma, from the Division of General Internal Medicine and Primary Care, serve as senior clinical advisors to Possible Health.

Peru

Socios En Salud (SES) is the division's partner organization in Peru that focuses on patient care and clinical research. SES delivers multiple allied community-based projects centered on mental health, child development, and micro financing in a number of impoverished communities in Lima and Pisco/Chincha. SES collaborates with the division and HMS Department of Global Health and Social Medicine on research funded by NIH and other agencies. Areas of focus include TB, HIV, infection control, maternal health and early child development. With support from HMS, SES has implemented a research core to evaluate incoming research proposals for their relevance to the SES strategic priorities, potential impact on the populations served and the impact on capacity building at the site.

Current work builds on the division's longstanding relationship with SES, facilitating the change of the World Health Organization (WHO) standards for treatment of multidrug-resistant tuberculosis (MDR-TB) using second- and third-line drugs. In 1996, with SES support, the Peruvian Ministry of Health expanded MDR-TB treatment and care to hundreds of patients throughout the country, and today focuses on the management of MDR-TB as well as patients with extensively drug-resistant tuberculosis (XDR TB).

In 2009, division faculty, SES, and the Harvard School of Public Health (HSPH) embarked on a NIH-funded research project to evaluate the risk of infection in people exposed to different strains of TB in order to inform new strategies to reduce the spread of the disease. This landmark study, which included over 4,500 patients and 14,000 of their household contacts, was completed in August 2014; results are forthcoming. While this study was underway, SES erected a state-of-the-art biosafety level-3 (BSL-3) laboratory, now certified both nationally and internationally. The BSL-3 lab supports research protocols, including the HiRIF

study (a Trial of High-Dose Rifampin), the Center of Excellence for Translational Research (CETR) on the integrated discovery and development of innovative TB diagnostics, the Opti-Q study (Study Levofloxacin for the Treatment of MDR-TB), and the NIH-Fogarty-funded study seeking innovative interdisciplinary approaches for infection control and TB risk reduction in hospitals in Lima.

Russia

From a base in Tomsk Oblast, Siberia, division faculty and PIH have been working since 1998 in collaboration with the Russian Ministry of Health to combat one of the world's most severe epidemics of drug-resistant tuberculosis. The project has focused on improving clinical services for MDR-TB patients in Tomsk, while undertaking training and research to catalyze change in the treatment of MDR-TB across the entire Russian Federation. Key components of the clinical effort include improving diagnostics in order to detect cases earlier, developing a comprehensive strategy to strengthen the adherence to treatment among patients, and enhancing infection control in hospitals.

Starting in 2000, the project's program activities accelerated significantly, and to date with support from the Eli Lilly Foundation and the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM) PIH and the division, together with Tomsk TB Services, have enrolled over 2,500 MDR-TB patients for treatment

with quality-assured second-line drugs and have offered social support services to nearly 4,000 patients. In November 2013, the Tomsk Project and PIH were awarded the Karel Styblo Public Health Prize at the 44th annual International Union Against Tuberculosis and Lung Diseases Meeting.

The Eli Lilly Foundation has supported the majority of training and research initiatives organized by PIH and the Tomsk TB Program. The project created a center of excellence to provide training on MDR-TB with the goal of disseminating its success in combating MDR-TB beyond Tomsk. As a result, nearly 500 TB doctors from Russia and neighboring countries have gained knowledge and practical research experience on program and clinical management of TB and MDR-TB at the center. In 2011, a new fellowship training program was launched targeting clinicians dealing with TB and MDR-TB. The four-week-long fellowship includes clinical rotations in hospital and ambulatory settings, daily clinical case discussions on various aspects of MDR-TB management, and other program-related activities. As a part of its training initiatives, division faculty with have continued to conduct courses on evidence-based medicine (EBM), with more than 60 physicians and clinical residents trained in 2012 on the basics of clinical epidemiology and statistics, quantitative research methods, and clinical protocol design.



In 2013, the division and PIH successfully started the implementation of phase three of the Lilly Foundation grant, which resulted in the launch of a new effort aimed at strengthening infection control in TB hospitals through research and intervention in two Russian regions: Voronezh and Karelia. The new initiative is focused on finding cases, actively identifying patients with MDR-TB, separating patients safely to reduce exposure to drug-resistant tuberculosis (DR-TB) strains, and treating effectively with appropriate regimens. Preliminary results of the new project were presented at the Annual Russian TB Congress in St. Petersburg in October 2013. In addition, the patient-centered accompaniment program was introduced in Voronezh and Karelia to strengthen the impact on the burden of TB and MDR-TB.

Rwanda

In 2005, division faculty and PIH launched their first project in Africa through an innovative partnership with the Rwandan Ministry of Health, the Global Fund to Fight AIDS, Tuberculosis, and Malaria, and the Clinton Health Access Initiative (CHAI). Together with PIH's Rwandan sister organization, Inshuti Mu Buzima (IMB), the project has brought high-quality healthcare to three rural districts that previously had some of the country's worst health outcomes. Working closely with the Ministry of Health, the project provides direct services to a population of over one million people at three hospitals and 45 health centers, with the help of some 5,000 CWHs.

With funding from the Jeff Gordon Children's Foundation and technical assistance from the Dana-Farber/Brigham and Women's Cancer Center (DF/BWCC), the Rwandan Ministry of Health and IMB opened the Cancer Center of Excellence at Butaro Hospital in 2012. Building on IMB's previous work in diagnosing and managing chronic conditions such as HIV, TB, and non-communicable diseases, the center offers preventive care, pathology-based diagnosis, chemotherapy, surgery, referral for radiotherapy, follow-up care, and palliative care, as well as social and economic support. The center is a national referral facility, and IMB has contributed to national policy and implementation planning on

cancer care. In 2015, the center's services will expand through the Butaro Ambulatory Cancer Center, a facility newly built through support from the Cummings Family Foundation.

IMB has also made gains in the quality of care delivered by nurses, who deliver the majority of primary care in rural clinics throughout Rwanda. Initiated in 2010, the Mentorship, Enhanced Supervision, and Quality Improvement Program aims to improve quality of care through intensive training, mentoring, and supervision of health center nurses across many types of care. The Rwandan government, with the support of IMB mentors, has begun scaling-up the program across the country for HIV/AIDS.

In a training initiative made possible through the division partnership, IMB's Center for Training and Operational Research in Rwinkwavu hosted a third session of the HMS course in Global Health Effectiveness in March 2014. Global health leaders from across Rwanda and the United States gathered to learn from each other and leading academics from Harvard University and the Rwandan Ministry of Health. Division faculty based at IMB continue to host, train, and mentor visiting BWH internists, pediatric fellows from Boston Children's Hospital, residents from the BWH Howard Hiatt Residency in Global Health Equity, and HMS students.

Division faculty, led by Dr. Corrado Cancedda with support from Drs. Devon Hale, Marla McKnight, and Gene Bukhman, helped to conceptualize and implement the Human Resources for Health (HRH) Program, launched by the Government of Rwanda in 2012. BWH and HMS joined a consortium of 23 U.S. universities and academic medical centers participating in the program, which aims to support Rwanda's growing medical and educational capacity and help establish a world-class, self-sustaining national healthcare system. Division and other U.S. faculty members have begun to work with local institutions, colleagues, and trainees to train the next generation of doctors, clinicians, medical educators, nurses, and midwives across the main specialty and subspecialty areas over the course of seven years.

EDUCATION

The Division of Global Health Equity is committed to increasing the number of young physicians who aspire to dedicate their careers to improving the health of impoverished people in the U.S. and abroad. In 2004, the division, the Department of Medicine, and BWH created a unique residency program to address this growing interest. The Doris and Howard Hiatt Residency in Global Health Equity and Internal Medicine is a comprehensive, four-year program, that includes training in internal medicine, coursework in research methods, public policy, and global health advocacy, and research and patient care experiences in impoverished settings at PIH sites around the world. The residency program honors division co-founder Dr. Howard Hiatt and his late wife, Doris.

Residents in the program maintain a demanding training schedule in Boston and are engaged in lifesaving efforts around the world. Their projects target the deadliest treatable diseases – AIDS, TB, and malaria – in some of the world’s poorest countries. Accomplishments of recent residents include:

- Improving district-level health services in a rural district of Malawi
- Improving healthcare delivery in a district hospital in rural Nepal
- Scaling-up primary health services in Lesotho
- Training community health workers in Chiapas, Mexico
- Improving malaria control in Thailand
- Developing and implementing oncology treatment protocols in rural Rwanda
- Documenting successful efforts in Haiti and Rwanda to prevent the transmission of HIV from mother to child
- Building a graduate medical education program in Haiti, in collaboration with the Haiti Ministry of Health
- Strengthening a community health worker program in Navajo Nation
- Assessing health service coverage in Liberia
- Developing protocols for Ebola treatment units

Response to the residency has been enthusiastic, attracting attention from universities and teaching hospitals throughout the world. Interest among young physicians is strong, and program enrollment has grown from two residents in 2004 to 16 in 2014.

Division education efforts are deeply embedded at our partner sites. In Haiti, three residency training programs in general surgery, internal medicine, and pediatrics opened in October 2013. The newest residency programs in obstetrics and gynecology, and emergency medicine, were launched in October 2014, providing specialty training programs for Haitian clinicians in an environment that allows them to have the resources they need to provide the highest quality of care possible.

Division faculty members are also taking leadership roles in developing and disseminating public goods in education in global healthcare delivery. Under the leadership of Dr. Rebecca Weintraub, the Global Health Delivery Project (GHD), based at BWH and HMS, is generating new knowledge and professional networks in healthcare delivery through research, education, and virtual collaborations. Division faculty play a key role, with specific involvement including: analysis of care delivery systems for key conditions including HIV/AIDS, TB, and malaria; identifying and overseeing the development of a body of teaching cases; teaching; mentoring; and connecting healthcare implementers through professional virtual communities on www.GHDonline.org. GHD’s library of more than 30 teaching cases and companion teaching notes explore how leaders implement value-based principles. In 2014, GHD was commissioned to develop new case studies for the Ministerial Leadership in Health (MLIH) Program, a joint project of HSPH and Harvard Kennedy School. The first two cases will discuss nutrition interventions in Bangladesh and India, and national health insurance and universal health coverage in Thailand, Ghana, Rwanda, and Vietnam.

In 2014, the sixth annual Global Health Delivery Intensive (GHDI) Program took place, a three-week session in July with courses in epidemiology,

management science, and healthcare delivery. The 2014 cohort included 42 students from 16 countries, with over 200 professionals trained to date.

GHD's web-based platform, GHDonline, comprises professional virtual communities designed specifically for global health professionals worldwide. GHDonline now hosts more than 13,500 members, representing over 2,500 organizations from 182 countries, engaging across 13 public and 85 private communities of practice, each of which is focused on a common challenge in healthcare delivery and guided by one of 30 expert moderators. Over 300 clinical cases have been discussed to date in the clinical exchange private community - a tele-mentorship platform for

physicians and nurses at PIH hospitals in Rwanda, Malawi, Haiti, and Lesotho, to discuss difficult clinical cases with specialists in Boston. GHDonline continues to partner with UpToDate, a leading, peer-reviewed, clinical-information resource, at no cost. The UpToDate International Grant Subscription program on GHDonline has provided over 370 free UpToDate subscriptions to over 190 institutions, or an estimated 16,700 clinicians caring for more than 4.8 million patients. In 2014, the team was awarded a grant from the Commonwealth Fund to address breakthrough opportunities in healthcare involving health IT to support patient engagement, and frugal innovations from around the world that could have strong potential in the U.S. healthcare system.



Dr. Joia Mukherjee with Division of Global Health Equity residents in Haiti.

RESEARCH

Tuberculosis

The division has an active TB research program focused on optimizing treatment outcomes in patients with multidrug-resistant tuberculosis (MDR-TB). This ongoing work is a collaboration with PIH and the Department of Global Health and Social Medicine at HMS. Division faculty Drs. Salmaan Keshavjee, Mercedes Becerra, Carole Mitnick, Michael Rich, KJ Seung, Joia Mukherjee, Serena Koenig, Sonya Shin, Dylan Tierney, and Ed Nardell are conducting retrospective studies that apply novel analytic methods to clinical data from Peru, Russia, and Haiti. This group has produced multiple peer-reviewed publications that provide evidence that patients with MDR-TB who receive at least five likely effective drugs have significantly lower risks of death and recurrence, and significantly speedier response to therapy, compared to patients who receive fewer than five likely effective drugs. This group of investigators is also engaged in translating these results into practice through active participation in numerous global technical, policy, and program advisory boards.

Dr. Megan Murray is leading a NIH-supported project that links three different studies focused on drug-resistant tuberculosis and one on the epidemiology and transmission dynamics of MDR/XDR tuberculosis. To date, this project has recruited and followed over 4,000 TB patients and 12,000 household contacts.

Dr. Theodore Cohen is leading a NIH-funded study to investigate the prevalence and consequences of mixed-TB-strain infection in South Africa. He also works on surveillance strategies for monitoring the prevalence of MDR-TB in Moldova and South Africa. He serves on the steering committee for the TB Modeling and Analysis Consortium and is a member of the WHO's Global Task Force on TB Impact Measurement.

Dr. Carole Mitnick is conducting a NIH-funded clinical trial of high-dose rifampin for drug-sensitive TB in Lima, Peru.

Dr. Sonya Shin and SES are in the final year of the Community-based Accompaniment with Supervised

Antiretrovirals (CASA) project, which is exploring the use of the directly observed treatment short-course (DOTS) framework for HIV patients living in extreme poverty in the outlying communities of Lima. Also NIH-funded, this study follows 356 patients receiving community-based accompaniment and support to gain independence of the management of their disease and improve their long-term antiretroviral drug adherence and wellbeing. Health promoters, health professionals, and treatment supports are being interviewed to understand the benefits of directly observed therapy with highly active antiretroviral therapy (DOT-HAART) and expected findings include improved HIV outcomes, increased drug adherence, and psychosocial and socioeconomic stability among the cohort.

In 2013, division and SES researchers received a grant from Grand Challenges Canada to implement a screening and intervention "package" for children 6-24 months with risk of developmental delay in the impoverished community of Carabayllo in Lima, Peru. In this study, SES will partner with government leadership to implement programs designed to decrease the incidence of developmental delays in young children. Based on their prior success in using CHWs to manage complex health problems such as MDR-TB and HIV, SES will train Ministry of Health CHWs to identify children with developmental delays within the community and deliver a structured early intervention in the homes. In two additional provinces, SES will work with the health and education sectors to deliver an integrated approach to child development, including screening and developmental stimulation at "Early Stimulation Centers."

Now in its 18th year, division faculty, SES, and HMS partnership is stronger than ever and has developed a robust and sustained research infrastructure supporting epidemiological, clinical, and psychosocial interventions. Together with an in-house laboratory, pharmacy, and informatics group that is able to program and deploy mobile data collection instruments, the partnership is poised to increasingly develop and conduct research to address not only the priority public health problems affecting Lima, Peru, but also shared by and translatable to many other similar environments.

In Russia, studies led by Dr. Salmaan Keshavjee focus on treatment outcomes, risk factors for treatment failures, and community-based care delivery models. Recent publications describe the role of alcohol use in patients with MDR-TB and hepatotoxicity related to treatment.

In South Africa, Dr. Edward Nardell is conducting studies using an innovative approach to measure the transmissibility of mycobacterium TB. An experimental ward has been constructed that exhausts the air from patient rooms to chambers where hundreds of guinea pigs are exposed to airborne bacteria, and Dr. Nardell is using this facility to study interventions to protect healthcare workers from airborne infections, as well as to study TB pathogenesis and screen vaccine candidates.

Dr. Nardell's current study, funded by the Bill and Melinda Gates Foundation, uses the natural-transmission model to test the hypothesis that such a model will more accurately predict effectiveness of candidate vaccines in humans. A portion of guinea pigs has been vaccinated with bacille Calmette-Guerin (BCG) as a prototype vaccine, and a portion not. The ability of vaccines to prevent or limit natural transmission is being tested. Following this model, the foundation is building its own human-to-guinea pig transmission facility to test vaccine candidates in the Cape Town area.

Human Immunodeficiency Virus (HIV)

The division's HIV research agenda also spans multiple countries and sites with a common theme of improving care to those with the least access and greatest need.

In Haiti, Dr. Louise Ivers is completing a NIH-funded study that assessed the impact of a pilot nutritional intervention on HIV-positive individuals, and Dr. Serena Koenig is the primary investigator for an NIH-funded randomized trial evaluating the effectiveness of same-day HIV testing and treatment, compared to standard care, in Haiti. Dr. Koenig is also co-investigator for a proposal to improve the management of depression among HIV-infected

patients. Dr. Koenig, along with division colleagues, has also studied improvements in HIV treatment outcomes and lower costs over time, evaluating the impact of gender on HIV treatment outcomes, and evaluating the rates and risk factors of patients who become lost to care at every step from HIV testing to antiretroviral therapy initiation.

In Peru, Dr. Sonya Shin is working with SES, conducting a study on the impact of social support on medication adherence among HIV/AIDS patients with expected findings to include improved HIV outcomes, increased drug adherence, and psychosocial and socioeconomic stability among the cohort.

In Lesotho, Dr. Hind Satti is studying the diagnosis and outcomes of patients co-infected with HIV and MDR-TB.

In Rwanda, Dr. Michael Rich and several division colleagues have studied HIV treatment programs and their outcomes including clinical outcomes and high retention in care among adults in a community-based HIV treatment program in rural Rwanda; clinical outcomes of a comprehensive, integrated program for HIV-exposed infants; a three-year experience promoting HIV-free survival in rural Rwanda; and improved retention associated with community-based accompaniment for antiretroviral therapy delivery in rural Rwanda. In 2013, Dr. Rich, in collaboration with Doctors Without Borders, published a 300-page book, part of a clinical guideline series, that addresses drug-susceptible TB, MDR-TB, TB/HIV and TB of all forms in children.

Cholera

PIH continued to provide urgent care and ongoing community outreach in response to the widespread cholera outbreak that began in October 2010, including administration of a pilot oral cholera vaccination campaign in 2012, and national and international advocacy efforts to draw continued attention to the structural causes of cholera. Dr. Ivers currently works with a team from Partners HealthCare and HMS to conduct and analyze several NIH-funded studies, including a case control study to evaluate

the field effectiveness of oral cholera vaccine where the pilot took place in the Artibonite as well as an expanded location in the Central Plateau, and several immunological studies on immune responses in vaccinated Haitians.

Health System Strengthening

Division faculty are implementing and evaluating health systems strengthening programs in rural southeastern Rwanda. Led by Dr. Peter Drobac, this multi-year project, the Rwanda Population Health Implementation and Training (PHIT) Partnership, was established in 2009 with support from the Doris Duke Charitable Foundation's African Health Initiative. The partnership endeavors to improve the capacity and performance of the health system in two rural districts with targeted financial and technical investments focused on health centers, coupled with quality-improvement initiatives designed to improve service delivery and to strengthen monitoring and evaluation systems. Aspiring to create a replicable, evidence-based road map for district-level primary healthcare delivery, the partnership has developed an integrated model of implementation, operational research, and impact evaluation to facilitate refinement and rigorous evaluation of the intervention.

Dr. Sonya Shin was awarded support from the Patient Centered Research Outcomes Institute (PCORI) to evaluate the impact of the Community Outreach and Patient Empowerment Program in Navajo Nation.

School-based Interventions for Child Health

Dr. Mary Catherine Arbour is leading the health component of a large randomized community trial of school-based interventions in impoverished urban neighborhoods in Santiago, Chile. Investigators are examining the impact of intensified case management within schools on outcomes including asthma frequency and school absenteeism. In addition, Dr. Arbour was funded to evaluate the benefits of home visits on early childhood development also in Santiago, Chile.

Global Health Economics

Global health economics research in the division focused on developing research tools to track, measure, and analyze healthcare financing at the local, national, and global levels; evaluating the impact of global health aid on health system strengthening and population health outcomes in developing countries at both the macro and micro levels; designing and assessing community-based health financing approach in achieving universal health coverage in developing countries; and measuring the economic burden of diseases. Dr. Chunling Lu collaborates with colleagues at PIH and the Department of Global Health and Social Medicine at HMS to conduct research projects in countries such as Rwanda and China. The research has yielded multiple publications in peer-reviewed journals. For example, tracking financial data for rural health facilities is difficult in low-income countries and hinders monitoring and evaluation of local health facility performance. Collaborating with colleagues in the Rwandan Ministry of Health, Dr. Lu's team developed a five-step procedure for gathering quality financial data in rural health centers in Rwanda. The procedure, its survey instruments, and its cost estimation protocols are published in Public Library of Science (PLOS) Medicine. This framework will be integrated into the Rwandan national-level health information system and can be easily adopted for other facilities such as hospitals, pharmacies, and other programs such as curative care and preventive care in other developing countries.

Ebola Virus Disease (EVD)

Drs. Megan Murray and Louise Ivers are leading the division's research agenda addressing EVD. Working in collaboration with PIH, they will conduct studies on data collection infrastructure for facilities and local communities in West Africa. They will also conduct research to prepare for possible upcoming therapeutics, diagnostics, and vaccine studies.

Drs. Joia Mukherjee and Sara Stulac are leading the division's efforts to set up EVD treatment units in Sierra Leone and Liberia. Dr. Corrado Cancedda will lead PIH and division EVD efforts in Sierra Leone.

Future Directions

The division will undertake the following new and expanded initiatives in the coming academic year:

- In Haiti, division faculty will continue to play a critical role in the planning and implementation of a long-term strategy for rebuilding devastated healthcare infrastructure, and provide healthcare and support services to those patients most in need.
- As the national teaching hospital (HUM) in Haiti becomes fully operational, faculty will work towards providing primary care services to a catchment area of 185,000 people in Mirebalais and two nearby communities serving 500-700 outpatients per day. The newest residency programs in obstetrics and gynecology, and emergency medicine, began in October 2014, providing specialty training programs for Haitian clinicians in an environment that allows them to have the resources they need to provide the highest quality of care possible.
- In Haiti, the division has established an administrative fellowship and exchange, building administrative skills and capacity among rising leaders at partner institutions. The fellows will spend two months embedded in departments at BWH.
- The division will continue to implement Human Resources for the Health Rwanda medical education initiative alongside the government of Rwanda, PIH, and HMS, to dramatically increase the clinical training of Rwanda healthcare providers and specialists.
- Division faculty will further develop a clinical trial of the TB vaccine BCG, with a NIH planning grant to prevent TB transmission to the researchers, students, and humanitarians who travel to high-burden settings such as Africa, Asia, and Eastern Europe.
- The GHD Project launched new U.S.-based communities with AHRQ funding. GHD will also offer the 7th Annual GHD Summer Intensive, develop new cases to build out the GHD curriculum, and identify and formalize skills and training pathways for global health delivery professionals.
- In partnership with PIH and HMS, the division will nurture and strengthen local residency programs in Rwanda and Haiti.
- The Community Outreach and Patient Empowerment Program (COPE) will pilot a childhood obesity prevention curriculum (Happy Homes) in the Eastern Navajo area with preschool children and their parents. COPE will work to start a project funded by Con Alma to set up a community garden to promote inter-generational and cross-cultural teachings of food traditions.
- In 2015, the division and Ariadne Labs plan to work together to enhance faculty relationships creating opportunities for career growth and development and continuing to share ideas about how to shape global public health. 



FACULTY ROSTER

Professor

Paul Farmer, M.D., Ph.D.*
Howard Hiatt, M.D.

Associate Professor

David Bangsberg, M.D.*
Mercedes Becerra, Sc.D.*
Heidi Behforouz, M.D.
Araceli Castro, Ph.D.*
Theodore Cohen, M.D., Ph.D., D.P.H.
Louise Ivers, M.D., D.T.M.H.
Salmaan Keshavjee, M.D., Ph.D.
Felicia Knaul, Ph.D.*
Joia Mukherjee, M.D.
Megan Murray, M.D., Sc.D.
Edward Nardell, M.D.

Assistant Professor

Gene Bukhman, M.D., Ph.D.
Andrew Ellner, M.D.
Hamish Fraser, M.B.Ch.B.
Lisa Hirschhorn, M.D. (Assistant Clinical Professor)
Serena Koenig, M.D.
Chunling Lu, Ph.D.
Carole Mitnick, Sc.D.*
Joseph Rhatigan, M.D.
Sonya Shin, M.D.
Rebecca Weintraub, M.D.

Instructor

Omowumni Aibana, M.D.
Mary Catherine Arbour, M.D.
Margaret Bourdeaux, M.D.
Corrado Cancedda, M.D., Ph.D.
Chadi Cortas, M.D., Ph.D.
Ranvir Dhillon, M.D.
Ashwin Dharmadhikari, M.D.*
Peter Drobac, M.D.
Neil Gupta, M.D.
Helen Jenkins, Ph.D.*
Jonathan Iralu, M.D.*
Hema Magge, M.D.
Aaron Mann, M.D.*
Duncan Maru, M.D.
Marla McKnight, M.D., Ph.D.
Michelle Morse, M.D. (Assistant Clinical Instructor)
Koji Nakashima, M.D.
Daniel Palazuelos, M.D.
Rajesh Panjabi, M.D.
Jonathan Parr, M.D.*
Jonathan Quick, M.D.*
Ruma Rajbhandari, M.D.*
Michael Rich, M.D.
Peter Rohloff, M.D.*
Sara Selig, M.D.
Kwonjune Justin Seung, M.D.
Sara Stulac, M.D.
Neo Tapela, M.D.
Ralph Ternier, M.D.
Dylan Tierney, M.D.
David Walton, M.D.
Emily Wroe, M.D.

*Connotes secondary appointment in the
Division of Global Health Equity

SELECT MAJOR FACULTY ACCOMPLISHMENTS

Chadi Cortas, M.D.

- Marshall Wolf Award in Social Medicine and Health Equity

Andrew Ellner, M.D.

- Keynote Speaker, National Forum on Primary Care, Singapore National Health Group
- CRICO Risk Management Foundation Grant, to support a learning collaborative of 20 primary care practices in seven health systems to strengthen team-based primary care and build safe, highly reliable systems for ensuring early cancer diagnosis and coordinated care for patients with complex care needs
- Published, "Launching the Harvard Medical School Academic Innovations Collaborative: transforming primary care practice and education within teaching practices," with Asaf Bitton

Paul Farmer, M.D., Ph.D.

- Honorary Master's of Philosophy in Human Ecology, College of the Atlantic
- Honorary Doctor of Science, University of Oslo Faculty of Medicine
- Delivered Lecture, "Chronic Infectious Disease and the Future of Health Care Delivery," Continuing Medical Education in Infectious Diseases: Infectious Diseases in Primary Care Course, Brigham and Women's Hospital
- Delivered Medical Grand Rounds, "Pandemic Ebola Virus Disease: Integrating Prevention and Care," Brigham and Women's Hospital
- Delivered Pediatric Grand Rounds, "Chronic Infectious Disease and the Future of Health Care Delivery," Stanford School of Medicine
- Delivered Speech, "What is Global Health Equity? A physician-anthropologist's perspective," National Youth Leadership Forum, HMS

- Delivered Speech, "To Alleviate Human Suffering: Our Work to Strengthen Global Healthcare," Global Health Summit, Brigham and Women's Hospital
- Delivered Keynote Address, "Surgery and Global Health Equity," The Lancet Commission on Global Surgery
- Delivered Lecture in Global Health and Population 532, "Chronic (Infectious) Disease and Global Health Equity," HMS
- Delivered Speech, "Building Bridges to Improve Cancer Care in Settings of Poverty: Lessons from Haiti, Rwanda, and Malawi," Annual Meeting, American Society of Clinical Oncologists
- Delivered Speech, "Ebola: Beyond the Headlines," Talks at Google
- Delivered Speech, "New Frontiers in Tuberculosis Care and Control: Lessons from the 'Delivery Decade'," Russian Academy of Sciences
- Delivered Speech, "Having a 'There,' There, Reflections on Global Oncology," Global Oncology Symposium, Dana-Farber Cancer Institute
- Delivered Lecture, "Community-based Care of Chronic Infectious Disease: Lessons from Haiti and Rwanda," The Beyond TB Lecture, Union North American Region Conference
- Delivered Lecture, "Health and Social Justice: Lessons From Haiti and Rwanda," St. George's School
- Delivered Speech, "The Role of the University in Global Health," New England Consortium on Medical Education
- Delivered Keynote Speech, "Reimagining Global Health: The Significance of Community-Based Care," Kraft Center for Community Health
- Delivered Speech, "The Future of Global Health: Lessons from Haiti and Rwanda," 18th Annual International Meeting, American Telemedicine Association

SELECT MAJOR FACULTY ACCOMPLISHMENTS (continued)

- Delivered Lecture, “A Case Presentation of a Child with Multiple Abscesses and Likely Bacteremia,” Academic Summit, Hôpital Universitaire de Mirebalais
- Co-developed and Taught, Economics 2395: Health and Social Justice: Reshaping the Delivery of Health, with Professor Amartya Sen
- Developed Global Health Equity Option in Scholarship Abroad (GHEO Scholars) Program, a new study-abroad program at Harvard College that integrates a global health internship and research project at Compañeros En Salud (CES), PIH’s sister organization in Chiapas, Mexico, with a full semester of Harvard undergraduate courses, taught by Harvard faculty through small-group videoconferencing. In 2014, the GHEO Scholars Program will allow two undergraduate students to study the delivery of healthcare in resource-poor settings by combining experiential learning with innovative pedagogy. By integrating interdisciplinary Harvard College coursework with a field-based internship and research project, the program will provide a unique opportunity to advance students’ intellectual and practical engagement with the emerging field of global health.
- Published, “Shattuck Lecture: Chronic infectious disease and the future of health care delivery,” *The New England Journal of Medicine*; 2013 [In press].
- Published, “In the Company of the Poor: Conversations with Dr. Paul Farmer and Fr. Gustavo Gutierrez,” Maryknoll: Orbis Books; 2013.
- Published with Jim Yong Kim, “What’s missing in the Ebola fight in West Africa,” *Washington Post*; August 31, 2014.
- Published, “Diary,” *London Review of Books*; October 23, 2014.

Hugo Flores, M.D.

- Invited to attend “Salud 360” conference on the Right to Healthcare and Accompaniment at Tecnológico de Monterrey University and the “Semana del Médico 2014” conference on Global Health - New Paradigms, Universidad Autónoma de Colima
- Hosted HSPH M.P.H. students and lectured on public-private partnerships and other global health topics during their two-day visit
- Hosted and mentored two Global Health Equity Option (GHEO) scholars for the semester

Lisa Hirschhorn, M.D.

- Appointed Director, Implementation and Improvement Sciences, Ariadne Labs
- Led the development of a Coaching in QI syllabus through PEPFAR-supported work in Tanzania and Haiti
- DDCF International Medical Scholars Grant, funding three medical students to pursue research for a year under the mentorship of Harvard-based faculty
- Directed, Pursuing Inquiry in Medicine Course, HMS
- Member, Scholars in Medicine Executive Committee, HMS

Louise Ivers, M.D., D.T.M.H.

- Presented Three Oral Cholera Presentations, Annual Meeting, American Society of Tropical Medicine & Hygiene

Salmaan Keshavjee, M.D., Ph.D.

- Published, “Blind Spot: How Neoliberalism Infiltrated Global Health”
- Named Director, Center for Global Health Delivery-Dubai, HMS

SELECT MAJOR FACULTY ACCOMPLISHMENTS (continued)

Duncan Maru, M.D., Ph.D.

- Early Independence Award (“Integrating pediatric care delivery in rural healthcare systems”), NIH
- Child Health Research Award (“Integrating Pediatric Care Delivery in Rural Healthcare Systems”), Charles Hood Research Foundation

Michelle Morse, M.D.

- Facilitated ACGME Pre-evaluation Visit to Mirebalais Hospital in Haiti for international accreditation

Megan Murray, M.D., Sc.D.

- NIH Grant, to integrate discovery and development of innovative TB diagnostics to address issues related to molecular diagnostics, and genetic determinants of phenotypic resistance through a multi-disciplinary collaboration with long-term goal is to develop a diagnostic strategy that will improve the diagnosis of childhood and DR-TB and stem the further spread of the disease
- Delivered Lecture, “Genetic Diversity of DR-TB: Implication for Future Diagnostics,” The Global Crisis of Drug-Resistant Tuberculosis and the Leadership of the BRICS Countries: Challenges and Opportunities, Institute of Medicine and Chinese Academy of Sciences Workshop
- Delivered Lecture, “Evolution of drug-resistance in TB genomes,” International Conference of the Union for TB and Lung Disease
- Delivered Lecture, “Diagnostics: Genotyping,” 18th Annual Conference of the Union-North America Region
- Delivered Lecture, “The Genetics and Pathogenesis of MDR and XDR-TB Drug Resistance,” Conference on Retroviruses and Opportunistic Infections (CROI)
- Delivered Lecture, “Genetic basis for transmission of MDR-TB,” 9th International Conference on the Pathogenesis of Mycobacterial Infections

Joe Rhatigan, M.D.

- Excellence in Teaching Award, HSPH

Sonya Shin, M.D.

- PCORI Health Disparities Grant, to evaluate the impact of community-based outreach for individuals living with chronic health conditions in Navajo Nation
- CDC REACH Grant, to bring about policy, system, and environment changes throughout Navajo Nation to increase the access to healthy foods in Navajo stores, and to increase access to chronic diseases prevention through stronger clinic-community linkages

Rebecca Weintraub, M.D.

- Promoted to Assistant Professor, HMS
- Young Global Leader, World Economic Forum
- Faculty Fellowship Award, Berkman Center for Internet and Society, Harvard University
- Published Scholarly Paper, “When scaling prevention means scaling demand: Voluntary medical male circumcision in Nyanza Province, Kenya,” *Healthcare: The Journal of Delivery Science and Innovation*
- Commissioned to Develop a Case Study Series, Ministerial Leadership in Health Forum (MLIH), HSPH and HKS
- Published Three Teaching Cases, Lancet Commission for Global Surgery
- Published Abstracts, *Lancet Global Health*



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