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New Academic Partnerships in Global Health: Innovations at Mount Sinai School of Medicine

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Abstract

Global health has become an increasingly important focus of education, research, and clinical service in North American universities and academic health centers. Today there are at least 49 academically based global health programs in the United States and Canada, as compared with only one in 1999. A new academic society, the Consortium of Universities for Global Health, was established in 2008 and has grown significantly. This sharp expansion reflects convergence of 3 factors: (1) rapidly growing student and faculty interest in global health; (2) growing realization—powerfully catalyzed by the acquired immune deficiency syndrome epidemic, the emergence of other new infections, climate change, and globalization—that health problems are interconnected, cross national borders, and are global in nature; and (3) rapid expansion in resources for global health. This article examines the evolution of the concept of global health and describes the driving forces that have accelerated interest in the field. It traces the development of global health programs in academic health centers in the United States. It presents a blueprint for a new school-wide global health program at Mount Sinai School of Medicine. The mission of that program, Mount Sinai Global Health, is to enhance global health as an academic field of study within the Mount Sinai community and to improve the health of people around the world. Mount Sinai Global Health is uniting and building synergies among strong, existing global health programs within Mount Sinai; it is training the next generation of physicians and health scientists to be leaders in global health; it is making novel discoveries that translate into blueprints for improving health worldwide; and it builds on Mount Sinai's long and proud tradition of providing medical and surgical care in places where need is great and resources few.

Keywords

academic health center; Consortium of Universities for Global Health; global health; Global Health Training Center; Mount Sinai

“Academic medicine must take more responsibility for global health.”

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Global health has become an increasingly important focus of education, research, and clinical service in North American medical schools and universities. In the past decade, academic global health programs have grown dramatically in size and number.¹ Many of these new programs are interdepartmental and university-wide in scope. Some are generously endowed. These programs have become increasingly interdisciplinary, and today they involve schools of medicine and public health as well as schools of engineering, business, law, the social sciences, theology, and international relations. In medical schools, these programs support educational offerings in global health for medical students as well as master's-level, doctoral, and postdoctoral training. A number of North American academic global health programs have developed formal partnerships with medical schools and healthcare institutions in low- and middle-income countries (LMICs) and are engaged in joint efforts to build professional capacity in their partner countries as well as in student exchanges, provision of medical care, and collaborative research. Global health has also become a focus of intense interest at the US National Institutes of Health (NIH), and NIH Director Francis Collins has named improvement of global health one of his top priorities.²

This sharp expansion in academically based global health reflects a convergence of 3 factors:

- Rapidly growing student and faculty interest in global health. A 2010 survey of incoming first-year medical students at Mount Sinai School of Medicine (MSSM) conducted under the auspices of the American Association of Medical Colleges found that 74% of students expressed a desire to spend at least some portion of their professional careers working in an LMIC. This represents a more than 10-fold increase in such interest from a decade earlier.
- Growing societal recognition of the importance of global health. This growth has been catalyzed by a series of factors, including the global epidemic of acquired immune deficiency syndrome (AIDS); the emergence and global spread of other newly recognized infectious diseases such as severe acute respiratory syndrome (SARS), bovine spongiform encephalopathy, Nipah virus, and H5N1 and H1N1 influenza; global climate change³; globalization of the economy; faster and cheaper travel leading to significant migration; and unprecedented growth of the world's population.⁴
- Rapid growth in resources for global health. Major infusions of new funding for global health and international collaboration have become available in the past decade from the Bill & Melinda Gates Foundation; the President's Emergency Plan for AIDS Relief; the US Agency for International Development; the Global Fund to Fight AIDS, Tuberculosis and Malaria; the President's Malaria Initiative; the Bloomberg Foundation; the Wellcome Trust; the NIH through the John E. Fogarty International Center Advancing Science for Global Health (Fogarty International Center); the Centers for Disease Control and Prevention (CDC); and from corporate and private philanthropists.¹

Today, as a result of these trends, there are at least 49 global health programs in academic institutions in the United States and Canada, as compared with only one in 1999.⁵ A new academic society, the Consortium of Universities for Global Health (CUGH), was established in 2008 to promote, facilitate, and enhance global health as an academic field of study, with the ultimate goal of making "the university a transforming force in global health."^{1,5}

This article will examine evolution of the concept of global health over the past century. It will describe the driving forces that have sparked societal and academic interest in global health, trace the recent evolution of global health programs in North American universities

and academic health centers, and present a blueprint for development of Mount Sinai Global Health, a new school-wide global health program at MSSM.

EVOLUTION OF FUNDAMENTAL CONCEPTS IN GLOBAL HEALTH

Global health had its origins more than a century ago in the fields of tropical medicine and hygiene. In that phase, the discipline concerned itself largely with the infectious diseases of “others” in warm climates. Tropical medicine enjoyed remarkable successes such as the conquest of yellow fever, which made possible construction of the Panama Canal. In that era, the discipline was driven largely by the concerns of scientists and policy makers in developed countries.

In the 1960s and 70’s, tropical medicine evolved into international health. International health grew beyond a singular focus on tropical diseases to include other infectious diseases such as smallpox, as well as maternal and child health, and immunizations.

International health also came gradually to encompass issues beyond infectious diseases, such as nutrition (especially undernutrition), family planning, and reproductive health as well as ecological contributions to disease. International health had a strong focus on the health of populations and thus shared many of the features of public health. In this phase, the field was still driven largely by the concerns of scientists and policy makers in developed countries.

Global health in its current iteration arose in the 1980s and 90’s and came of age in the early 21st century. It encompasses all the concerns of its predecessor phases, but also incorporates disciplines beyond tropical medicine and public health such as law, engineering, clinical medicine, and the social sciences, and it emphasizes different priorities.

More than either of its predecessor phases, global health today seeks to build true partnerships between high-income and lower-income countries and institutions, while emphasizing health equity.

Reflecting the concerns of developing countries and new realities in patterns of disease, global health focuses increasingly on noncommunicable diseases (NCDs), environmental and occupational health, health systems, and the health workforce. Thus, global health is a field of study, practice, and research that transcends borders, engages in multidisciplinary activity, and includes both population-based and clinical foci.⁶

DRIVING FORCES IN GLOBAL HEALTH

At the heart of today’s major issues in global health lie a few basic driving forces. Poverty, educational inequities, population growth, urbanization, growing inadequacy in the size of the health workforce, emerging infections, global spread of the “Western” lifestyle, global movement of hazardous industries and toxic chemicals, and climate change are among the most important of these drivers (Table 1).

Poverty

Poverty is a powerful determinant of health and disease. The relationship between poverty, ill health, and shortened life expectancy has been recognized for almost 200 years.⁷ Stark economic inequities continue to plague the world today, and the richest 10% of the population now owns 85% of the world’s assets,⁸ while 1.4 billion people live in extreme poverty, with incomes <\$1 per day.⁹

Great inequities in health result from these economic disparities, and these inequities exist both among and within countries. For example, infant mortality in the world's poorest countries exceeds 150 per 1000 live births, compared with 6 per 1000 in the United States. In the world's poorest countries, 16% of the population is undernourished. Life expectancy in the poorest countries is only about half that of the developed world. Thus life expectancy at birth in 2004 in South Africa is 48 years¹⁰ as compared with 77.5 years in the United States.¹¹ In 2006 the average white American was expected to live nearly 5 years longer than the average African American (78.2 versus 73.2 years).¹⁰

Educational Attainment

Educational attainment is a second major determinant of health. The links between education and health are well established.¹² Though there has been some improvement in global primary school enrolment over the last decade, regions, such as sub-Saharan Africa, remain in which nearly one-quarter of school-age children do not receive school-based education.⁹

Population Growth

Population growth is a third major determinant of health. World population today is 6.9 billion, including 2.2 billion children. By 2050, world population will be 9 billion.^{4,13} When population growth outstrips basic resources such as food, water, sanitation, and access to healthcare, ill health results.

Lack of education is a powerful driver of population growth. Education of girls and young women has repeatedly been shown to be one of the most effective means for slowing population growth and thus improving health.^{14,15}

Rapid Urbanization

Rapid urbanization is a fourth major determinant of health and disease. Urbanization creates new opportunities, but also carries with it significant health problems, especially in the new mega-cities of the developing world. Cities often concentrate populations in coastal areas and along tectonic fault lines, places subject to devastating natural disasters. The growth of cities often comes at the loss of prime agricultural land and may lead to water-source vulnerability. The density of city populations places communities at risk for infectious-disease transmission and massive energy constraints.¹⁶ In 2008 the world's urban population (3.5 billion) exceeded the rural population (3.4 billion) for the first time in recorded history.^{4,17}

Inadequacies in the Healthcare Workforce

Inadequacies in the healthcare workforce are a consequence of rapid population growth and urbanization. Massive growth in population has typically not been accompanied by a parallel growth in healthcare resources. It is not only physicians who are in short supply, but also nurses, laboratory technicians, medical officers to staff rural health clinics, community health workers, and health educators. The bulk of healthcare in LMICs is provided by nonphysicians, and it is the entire system that is weak, often made weaker by outmigration of the most highly trained personnel for economic reasons—the “medical brain drain” and the “nurse drain.” The consequence is a critically small healthcare workforce that is unable to adequately cope with the growing double burden of both communicable diseases and NCDs in the developing world.^{18,19}

New Infectious Diseases

New infectious diseases such as SARS, influenza, and West Nile virus continue to emerge and have become a powerful force in global health. More than 40 infectious diseases have been newly recognized in the past 40 years. New zoonotic sources of emerging infections have been noted as well, and they underscore the importance of collaborations between human and veterinary medicine worldwide. With changes in technology and travel, new infections can now cross borders and even oceans with frightening rapidity.^{20–22}

Global Spread of the Western Lifestyle

Global spread of the Western lifestyle is another powerful determinant of health and disease.²³ Chronic diseases once seen only in high-income countries are now epidemic in the LMICs. Multinational corporations target the developing world with ad campaigns, persuading young Cambodians, Bolivians, and Malawians that they must have a hamburger, a beer, and a cigarette, and centuries-old diets and traditional behavioral norms erode. Today nearly 20% of schoolchildren in China are now overweight or obese.²⁴ Heart disease, diabetes, and cancer have become major killers in Asia and sub-Saharan Africa.²⁵ And with >50% of the world's population now living in cities, this spread of Western diseases to the developed world will likely continue to accelerate.

Environmental Influences

Finally, environmental influences are gaining greater recognition as determinants of global health.

Toxic Chemicals and Hazardous Industrial Processes—Toxic chemicals and hazardous industrial processes no longer tolerated in North America or Western Europe are exported to developing countries, where populations are exposed to lead,²⁶ highly toxic pesticides,²⁷ and products made of asbestos²⁸ in circumstances where protective controls are weak or nonexistent. The consequences include cancer, birth defects, and sterility.

Climate Change—Climate change will have ongoing influences on the spread of disease, as higher temperatures favor the wider extension of habitat for certain disease vectors.²⁹ Thus certain vector-borne diseases such as malaria and dengue are expected to occupy more extensive ranges in future years than they do today. Global warming will also influence health by provoking shortages of safe drinking water. Waterborne epidemics such as cholera will result. Children will suffer disproportionately the health consequences of global climate change.³⁰

EVOLUTION OF GLOBAL HEALTH PROGRAMS IN NORTH AMERICAN UNIVERSITIES AND ACADEMIC HEALTH CENTERS

Modern global health came of age in 2005 at Boston University, where Dr. Gerald Keusch (former MSSM faculty) organized a symposium for universities interested in global health. This gathering raised many important issues and interests and raised the prospect of a potential alliance of academic programs. The concept of such an alliance was raised again at a 2007 symposium at the University of California, San Francisco, convened by the Bill and Melinda Gates Foundation, and at another planning meeting there in 2008.

In 2008, as a consequence of the foregoing conversations, the CUGH was formed.⁵ The CUGH is committed to reducing health disparities worldwide, exchanging knowledge and experience in global health through true global partnerships, and working with multiple disciplines and in an interdisciplinary manner. Now with >50 members, CUGH has grown

rapidly. The 2010 annual scientific meeting in Seattle had >700 participants. It is striking that a wide variety of academic institutions have global health programs—liberal arts colleges without graduate or professional schools, research universities with and without health science professional schools, and all the other variations of higher education in North America.

BLUEPRINT FOR DEVELOPMENT OF NEW ACADEMIC GLOBAL HEALTH PROGRAM AT MOUNT SINAI SCHOOL OF MEDICINE

In 2010, MSSM created a new academic global health program: Mount Sinai Global Health. This program was designed to be school-wide in its scope, and it was placed under the direction of a newly appointed dean for Global Health who reports directly to the dean of the School of Medicine. It is guided by a Global Health Faculty Council drawn from senior leaders within the Mount Sinai Medical Center and by an external advisory council composed of leaders in global health from beyond Mount Sinai.

The mission of Mount Sinai Global Health is to enhance global health as an academic discipline within Mount Sinai and to improve the health of people around the world through partnerships in education, research, and medicine.

Mount Sinai Global Health has been accepted as a full member of CUGH. In September 2010 it was designated a Collaborating Centre by the World Health Organization (WHO).

Mount Sinai Global Health builds on Mount Sinai's unique strengths as an independent, deeply altruistic, hospital-based academic health center in the world's most globalized city. Its operational strategy is to build upon the many programs in global health that have been created over the past decade within various departments of MSSM, the Mount Sinai Hospital, and the Mount Sinai Graduate School of Biological Sciences, and from them to create new, synergistic, value-added initiatives. Through campus-wide review of existing programs in global health, Mount Sinai Global Health has identified the following as key areas of initial focus:

- Education: internal education in global health within Mount Sinai, global capacity-building in medicine and public health.
- Research: emerging infectious diseases, cardiovascular and metabolic disease, environmental and occupational health, cancer.
- Clinical service: maternal and child health, emergency medicine, surgery (general surgery, obstetrics/gynecology [OB/GYN], ophthalmology), psychiatry, geriatrics.

Education in Global Health

Education is a key focus for Mount Sinai Global Health. The program's 2 goals in education are:

- To educate all Mount Sinai students, house staff, fellows, and faculty about key issues in global health and to train future academic leaders in the field.
- To build global capacity in public health and medicine in partnership with selected institutions in LMICs.

To achieve these goals, Mount Sinai Global Health builds on 2 strong education programs that have been built over the past decade:

- The Mount Sinai Global Health Training Center (GHTC), which is educating the Mount Sinai community in global health and training the next generation of global health leaders.
- Mount Sinai's international training programs in environmental and occupational health and in human immunodeficiency virus (HIV)/AIDS, both supported by the Fogarty International Center of NIH. These programs focus on building professional capacity in LMICs, principally in Latin America, and more recently in West Africa.

Mount Sinai Global Health Training Center—Since 2005, Mount Sinai's GHTC—with the support of the Mulago Foundation and private donors—has been educating medical students, residents, faculty, and fellows in global health. The mission of the GHTC is to improve the health of the underserved by training leaders in global health. The operational goals are to provide all Mount Sinai students, residents, fellows, and faculty with a basic awareness of key issues in global health, and to inspire the most gifted to focus a major portion of their professional careers on issues in global health and to become future leaders in the field. To accomplish these goals, GHTC has developed a 3-tiered curriculum:

- Tier One, an entry-level curriculum, is now embedded within the curriculum of MSSM and is offered to all medical students. It includes an introductory course in global health that examines such topics as the role of geography and poverty in global health, infectious and tropical diseases, the global spread of noncommunicable diseases, maternal and child health, nutrition, global climate change, and refugee health. This course is intended to give all Mount Sinai medical students an appreciation and basic working knowledge of key issues in global health.
- Tier Two of the GHTC curriculum provides international training opportunities of weeks to months duration for medical students, house staff, fellows, and faculty. A key element of Tier Two is the Global Health Fieldwork Preparatory Course. This preparatory course is a mandatory prerequisite for all students and other trainees who wish to receive travel support from GHTC and for students who plan to undertake mentored research or clinical field work overseas. Its architecture and content are described in Table 2.
- Tier Three of the GHTC curriculum provides more formalized and advanced training in global health for medical students, physicians, nurses, and other healthcare professionals through the Global Health Track in Mount Sinai's fully accredited master's in public health (MPH) program.³¹ This is a 42-credit, degree-granting program includes courses in maternal and child health, underserved populations, refugee health and human rights, humanitarian emergencies, and global environmental change.

The GHTC has sent trainees at all levels to work with partners in developing nations on research projects and public health programs, such as devising strategies for malaria control in rural Tanzania, studying the health impacts of water privatization in Bolivia, creating community health curricula for Native American students in North Dakota, and assessing the health of women and children in the Char islands of Bangladesh.

The GHTC has been a catalyst for sparking interest in global health throughout MSSM and across the Mount Sinai Medical Center.

Global Health Training Center Response to the Haiti Earthquake: The Mount Sinai GHTC responded to the devastating 2010 earthquake in Haiti with an outpouring of support

and service. Just 8 days after the quake, the institution mobilized a team of 27 health professionals to deliver care as part of a service mission coordinated by Partners in Health.³²

After this initial response, there was strong and ongoing interest in continuing service opportunities to relieve the suffering of the Haitian people. Recognizing the need to provide meaningful and effective service in a way commensurate with the specific skills and abilities of volunteer personnel, faculty from the Mount Sinai GHTC took on a leadership role in coordinating continuing relief efforts. Rather than developing a new service-delivery model in a chaotic and unfamiliar environment, Global Health faculty sought a partner with long-term experience on the ground that could accept volunteers and integrate them into a system of care. This partner was found in Project Medishare,³³ an organization based at the University of Miami that has been delivering service to Haiti since 1995. Because of its connection with the Haitian people and its proximity to the country, Project Medishare were able to open a tent hospital the day after the earthquake. They have operated this facility in one form or another ever since. Mount Sinai has already sent 2 large teams of volunteers to help staff Medishare's hospital and plans to continue recruiting volunteers for future missions.

Mount Sinai's International Training Programs—Mount Sinai has built 2 international training programs, both of them supported by the Fogarty International Center of NIH. They are a training program in occupational and environmental health based in the Division of International Health of the Department of Preventive Medicine, and a training program in HIV/AIDS based in the departments of Medicine and Preventive Medicine. Both have focused for many years on forging bidirectional collaborations with international research partners and are therefore guided by the principle that international collaborators are equal partners in research endeavors. Mount Sinai programs are viewed here as facilitators, rather than providing a “top-down” unidirectional form of aid.

International Training Program in Occupational and Environmental Health: This program has 4 components, each supported by a grant from the Fogarty International Center:

- The International Training in Environmental and Occupational Health (ITREOH) program has been funded continuously by the Fogarty International Center since 1995. Its goal is to build a leadership cadre in environmental and occupational medicine in Latin America and at the same time combat the brain drain of talented professionals from those countries to developed nations. The program has established formal institutional alliances in 3 countries: (1) Brazil at the Oswaldo Cruz Foundation, (2) Chile with the Department of Labor of the Ministry of Health and with the Chilean Association of Health and Safety, and (3) Mexico with the Institute of Public Health in Cuernavaca and with the Institute of Social Security in Mexico City. These collaborations have provided training to 52 fellows in environmental and occupational health, have led to the completion of 47 research projects resulting in approximately 25 research grants awarded in-country, and have supported >30 courses, symposia, and conferences and >100 peer-reviewed research publications.
- The International Exchange Program for Minority Students is supported through Fogarty by the National Institute of Minority Health and Health Disparities; this program was established in 2004 at Mount Sinai. The program selects 10 bachelor's, master's, and doctoral students from among nearly 200 applicants annually to participate in 3-month research-intensive experiences at predesignated sites around the world. All students are required to complete a mentored research project at their international sites and are encouraged to continue collaborating with their research mentors after program completion. Countries in which sites for

exchange students have been established include Mexico, Brazil, Chile, South Africa, Spain, and Ireland. To date, 58 students have completed the program, with 7 of them presenting at international conferences and 8 authoring peer-reviewed research articles.

- The Recovery Act Supplement to the ITREOH program is funded by the Fogarty International Center and is intended to provide support for developing distance-learning tools and materials that enhance Mount Sinai's current programs in global health.
- The International Training Program in Pediatric Environmental Health is supported through Fogarty under the Millennium Promise grants by the National Institute of Environmental Health Sciences and is intended to provide training for pediatricians, family medicine practitioners, nurses, and researchers in the identification, prevention, and treatment of children's disease of environmental origin. The program is developing an online course in pediatric environmental health based on a partnership with the WHO Programme on Children's Health and the Environment. Additionally, the program has established a summer certificate course in pediatric environmental health to be held at the National Institute of Public Health in Cuernavaca, Mexico. When first announced, this course attracted 51 applicants from 9 countries in Latin America, 16 of whom were selected for the training. In its second announcement, the number of applicants has doubled. Most recently, the program has established the Dr. Jenny Pronczuk Fellowship Program for Latin American physicians in honor of the former director of the WHO Programme on Children's Health and the Environment, who passed away in 2010. Pronczuk Fellows will train in research methods to address children's environmental health in their home countries. International partnerships for this program have been established in Colombia, Uruguay, Costa Rica, Mexico, and Spain.

International Training Programs in HIV/AIDS: The Mount Sinai Fogarty AIDS International Training and Research Program (AITRP) is designed to build research capacity in the developing world through partnership between MSSM and partner institutions in Argentina and Cameroon that will enable these countries to combat the global epidemic of HIV/AIDS:

- Through our interdisciplinary work in Argentina, Mount Sinai Global Health has had 10 highly successful years of building HIV/AIDS-related research capacity in collaboration with a wide array of Argentine partners. These efforts have focused on infrastructure development and multidisciplinary network building in clinical and research institutions. This work began with a bottom-up approach at the grassroots level. More recently, this bottom-up approach has been linked with a top-down strategy that involves major research institutions in Buenos Aires and the national Ministry of Health. This combined approach, which engages an extraordinarily broad range of Argentine partners and combines medicine and the social sciences, has provided myriad insights into the nature of the HIV/AIDS epidemic and thus helped to understand the gaps that exist across the continuum of prevention and treatment. The success of Mount Sinai Global Health in Argentina is evidenced by the large number of trainees Mount Sinai has graduated at many levels; by institutional changes resulting from trainees' work; by the rapidly increasing numbers of publications jointly authored by Argentine and Mount Sinai scientists; by the successful joint submission to NIH of a funded research proposal and the development of a second; by the joint development of an MPH program at the University of Buenos Aires (through Huesped Foundation) with HIV as the

specialty track; and by the establishment of formalized linkages between MSSM and the University of Buenos Aires' Medical School and Graduate School to support a PhD research track for specialists in infectious diseases.

- Mount Sinai Global Health is building interdisciplinary research capacity in HIV/AIDS in Cameroon in collaboration with strong new partners, notably the Cameroon Baptist Convention Health Board. In Cameroon, the Fogarty AITRP will be used as a model to guide the development of training pipelines for midlevel healthcare workers, particularly among those who are already heavily involved in community health development and mental health. This is an example of south-to-south collaboration.

Research in Global Health

Translational research that seeks to generate novel discoveries that translate into strategic blueprints for improving health and preventing disease worldwide is a key component of Mount Sinai Global Health. This research builds on robust research programs in global health already in place at Mount Sinai described in the paragraphs below.

Global Health Innovation Fund—To accelerate development of new cutting-edge research as well as innovative training programs in global health, Mount Sinai Global Health is launching a pilot project program: the Global Health Innovation Fund. This fund will provide small grants (\$10,000–25,000 per year for up to 2 years) on a competitive, peer-reviewed basis to researchers and educators throughout the Mount Sinai Medical Center who wish to pilot new research and education programs that are relevant to the overall goals and mission of Mount Sinai Global Health. This fund will concentrate resources in Mount Sinai's areas of greatest strengths in global health. The fund will operate by announcing the availability of funds widely across the entire Medical Center one or more times each year. Brief applications for funding will be solicited. These applications will be reviewed by the dean for Global Health and members of the Global Health faculty council. The most meritorious will be selected for funding. Progress will be tracked closely through an annual reporting requirement. All publications, presentations, programs, and grants generated through the program will be tallied as return on investment.

Key Research Programs—The following paragraphs describe key research programs in global health already in place at Mount Sinai. Mount Sinai Global health is building upon and creating synergies among these programs.

Emerging Infectious Diseases: In the developing world, infectious diseases—pneumonia, diarrhea, malaria, and AIDS—are the major causes of illness, disability, and premature death. In sub-Saharan Africa, Latin America, and Asia, they account for tens of millions of deaths each year—and most of the victims are children. At the same time, new infections emerging in the Third World can potentially spread to the United States...in the worst case within days or even hours.

Mount Sinai Global Health has developed a concerted effort to fight this scourge, focusing on 3 areas:

- Emerging infectious diseases, building on the groundbreaking work of Mount Sinai's Global Health and Emerging Pathogens Institute.
- Influenza virus, building on Mount Sinai's Center of Excellence in Influenza Research and Surveillance that includes studies of influenza virus in wildlife, domestic animals, and humans in many different regions of the world, including Vietnam, Europe, Guatemala, Argentina, Chile, Alaska, and California.^{34,35}

- West Nile, dengue, and other flaviviruses, based on studies ongoing in Pantanal, Brazil.

These global studies on infectious diseases are complemented with strong research programs on antivirals and vaccines aimed at diminishing the burden of viral diseases around the world.³⁶

Cardiovascular Disease, Obesity, and Diabetes: Heart disease, hypertension, diabetes, and stroke are all on the rise in developing countries, where rapidly increasing urbanization and Western eating habits have supplanted traditional rural life and fish-and-vegetable-based diets.^{23–25} Mount Sinai Global Health, in partnership with Mount Sinai's Cardiovascular Disease Institute, is leading a multipronged campaign to combat these trends. This campaign includes:

- *Plaza Sésamo*, an educational television project involving 6000 Colombian children aged 3–7 years that uses the Spanish-language version of *Sesame Street* to teach the importance of good health in developing both preventive and treatment strategies to curb the spread of cardiovascular and related illnesses.
- The Grenada Heart Project, a prospective epidemiologic study in partnership with the World Heart Federation tracking the emergence of heart disease, stroke, and diabetes as well as risk factors for these diseases in this rapidly developing Caribbean nation with the goal of devising effective strategies for disease prevention.³⁷
- The PolyPill Study, devising new single-pill strategies that combine multiple cardiac medications into a single pill for ease of administration in LMICs to promote secondary prevention of heart disease and stroke.³⁸

Environmental and Occupational Disease, Children's Environmental Health: Mount Sinai Global Health is deeply involved in efforts to study and prevent disease of toxic environmental origin in countries around the world.^{26–28} This work focuses on diseases of workers and also on chronic disease of environmental origin in children. Children are highly vulnerable to disease of toxic environmental origin because they have proportionately heavier exposures to chemicals in the environment compared with adults.³⁹ Also, children are highly sensitive to the toxic chemicals they encounter in the environment.

Cancer: Like cardiovascular disease, cancer has sharply increased in the developing world—again, due to urbanization and the rise in Western-style behaviors such as smoking and increased alcohol consumption. Mount Sinai Global Health, in partnership with Mount Sinai's Institute for Translational Epidemiology and the Tisch Cancer Institute, will spearhead efforts to study and combat this devastating and often fatal illness.

Clinical Service in Global Health

Mount Sinai Global Health continues and builds upon Mount Sinai's long and proud tradition of providing medical and surgical care in LMICs where need is great and resources few. We do this in partnership with the WHO, country governments, and charitable organizations in a manner that respects local knowledge and traditions, fosters long-term partnerships with Mount Sinai, and educates local doctors so that they are empowered to build professional capacity in their countries. The following are areas of particular clinical focus.

Maternal and Child Health—Pediatricians in the GHTC have taken the lead in maternal and child health programs within Mount Sinai Global Health. This work began in East

Harlem based on the recognition that concepts of global health apply also to Mount Sinai's own neighboring, often underserved communities. The first project was a community-based school clinic created in partnership with the Children's Aid Society that addressed the medical needs as well as the emotional health and dental health of East Harlem children.

The GHTC staff have also been involved in international research and public-health projects dealing with pediatric lead poisoning in Uganda; pediatric nutrition in Sri Lanka; adolescent anemia and newborn mortality in India; HIV peer education in rural Tanzania and Uganda; neonatal care, malnutrition, pediatric HIV, and pediatric clinical training in Liberia; prevalence and prevention of STDs and sexual-health education for health workers in Bangladesh; metabolic complications in HIV-infected pregnant women and their children; kidney disease in HIV-infected adults in Africa;⁴⁰ developmental assessment evaluation of social barriers to care of HIV+ orphans in Vietnam and Ethiopia, and the training of community health workers to prevent childhood mortality from malaria, pneumonia, and diarrhea in Mozambique.

Emergency Medicine—Mount Sinai Medical Center's Emergency Medicine Department is involved in efforts to build global partnerships in Liberia, Mozambique, and Haiti and is also undertaking global health work within New York City.

- In Liberia, Mount Sinai Emergency Medicine has forged a unique interinstitutional partnership with other US academic emergency medicine programs to provide near-continuous on-site supervision and teaching of trainees in Liberia's only tertiary care and trauma emergency department. This collaboration has provided a much-needed clinical service and health-worker training in a country currently in the postconflict reconstruction phase of development.
- In Mozambique, Mount Sinai Emergency Medicine has worked to build a program of training community health workers surrounding Gorongosa National Park, an area where the survival of the national park is intimately tied to the health of the adjoining communities.
- In Haiti, Mount Sinai Emergency Medicine deployed a team of nearly 30 doctors, nurses, and other medical professionals to deliver lifesaving emergency care to victims of the devastating January 2010 earthquake.
- Most recently, Mount Sinai Emergency Medicine has established a multidisciplinary clinic in New York City for survivors of torture. Based at Elmhurst Hospital Center, this clinic, the Libertas Center for Human Rights, has been helping meet the needs of torture survivors through mental health, medical primary care, specialty care, social work, and legal services. It is based on a model of comprehensive care founded at centers such as the Bellevue/New York University Program for Survivors of Torture.

Surgery—The Department of Surgery at Mount Sinai has created a month-long surgical rotation for its residents in the Dominican Republic. Also, a number of Mount Sinai surgeons and anesthesiologists have traveled to underserved communities overseas to perform surgeries that would not otherwise be available.

Women's Health—The Department of Obstetrics and Gynecology at Mount Sinai performs clinical work, training/education of local providers, and public health initiatives in women's health in West Africa and Central America. In these regions, the department has partnered with other US academic institutions and with other departments of Mount Sinai to foster a continued presence at local hospitals to support sustainable women's healthcare delivery. Mount Sinai OB/GYN teams have educated traditional birth attendants and

provided resources to combat maternal mortality, increased contraceptive delivery for women without access, and corrected fistulas in women who were destined to lifetimes of exile and ostracism.

To prepare OB/GYN residents for the challenges of global health delivery, the Department of Obstetrics and Gynecology has a Global Women's Health course required of all resident volunteers who wish to serve internationally. This course focuses on the biological, environmental, and societal pressures that affect women's health, pregnancy outcomes, reproductive health, and long-term survival. Topics include reproductive and obstetric health, women's rights, gender-based violence, family planning and contraception, female circumcision, obstetric fistula, maternal mortality, and the ethical and societal challenges influencing women's health outcomes. To further enhance academic collaboration, this course is offered annually to residents in all of the New York City-based residency program in obstetrics and gynecology.

To serve local underserved communities in New York City, the Department of Obstetrics and Gynecology has been implementing an Obesity and Pregnancy Intervention Program that educates and motivates obese, pregnant patients to achieve healthy weight gain in pregnancy. This program targets the vulnerable populations of women in East Harlem and the Bronx. It has achieved much success over the last 3 years, with >60 obese women enrolled in the program able to successfully minimize weight gain in pregnancy.

Ophthalmology—Mount Sinai's Global Health faculty, students, and residents partner with Virtue Foundation, Surgical Eye Expeditions, and other organizations to provide vital eye care to underserved patients as well as clinical training to local staff and physicians in developing countries across the globe such as Liberia, Tonga, and Cambodia. In addition, during the past 2 years, Mount Sinai medical faculty, students, and residents have performed several hundred ocular and oculoplastic procedures during teaching surgical missions at the First Hospital of Ulaanbaatar, Mongolia. In addition to surgical procedures, the local health department organized several city-wide didactic sessions.

The surgical team was struck by Mongolia's lack of basic medical equipment and infrastructure and the need for advanced surgical care. With the assistance and coordination of Mount Sinai medical-student volunteers, the team responded by procuring nearly \$50,000 of medical and surgical equipment to support local staff and provide necessary medical care in the country. A multidisciplinary team in partnership with Virtue Foundation plans to return to Mongolia in May 2011 to continue teaching and training local physicians and healthcare providers and to meet with high-level officials to establish long-term, high-impact, evidence-based, sustainable solutions toward advancing global health.

Finally, in 2011, Mount Sinai also plans to partner with Virtue Foundation to provide long-term development and training in El Salvador and Ghana.

Mental Health—Mount Sinai's Department of Psychiatry has developed substantial expertise in global mental health, focusing on post-trauma care for survivors of natural and manmade disasters as well as for torture survivors and refugees. The department has also begun to become involved in the development of mental-health systems in underserved regions.

Global Geriatric Medicine—Although many are aware that the developed world is aging rapidly, it is underappreciated that the developing world is aging even more rapidly. Within <10 years, for the first time ever, the world's population aged ≥65 years will be greater than the population aged <5 years.⁴¹ Projections indicate that by 2050 there will be >2 billion

people older than 60 in the world, 80% of whom will reside in the developing world. Additionally, the percentage of chronic NCDs (compared with communicable, maternal, perinatal, and nutritional conditions) in LMICs is dramatically increasing as their populations age.⁴² Geriatric medicine and public health have become important components of global health.

To meet these rapidly evolving needs, Mount Sinai's Brookdale Department of Geriatric and Palliative Medicine is directing training programs in the care of older persons for health professionals from Europe, Asia, Africa, the Middle East, and South America. The Certificate Program in Geriatric Medicine, established in 2003 under the auspices of the Department of Geriatrics and the Office of Graduate Medical Education, has trained 20 international scholars at Mount Sinai for an average of 3 months each. This program is now involved in on-site training of physicians, nurses, and other healthcare professionals in a number of countries including Bulgaria, China, Costa Rica, India, Lebanon, Malaysia, Malta, Mexico, Singapore, South Africa, Taiwan, and Turkey.

CONCLUSION

Mount Sinai School of Medicine is uniquely positioned to become a world leader in global health and to be one of the premier global health programs in the United States. Mount Sinai Global Health's great strengths include its base in a school of medicine; its foundation in Mount Sinai's traditions of medical excellence and social responsibility; and its location in New York City, the nation's largest, most diverse, and most intensely global city.

The formation of Mount Sinai Global Health reflects Mount Sinai's deep commitment to the health of people around the world, beginning with the people of our own community of East Harlem in New York City. It places Mount Sinai in the company of the nation's leading academic health centers. It provides an opportunity to unify, focus, and create synergies among the array of global health programs that have arisen at Mount Sinai and to build on the extraordinary enthusiasm of our students and faculty.

Global health challenges are too great and too urgent to be left to scattershot attempts at solutions. Every day, immigrants, tourists, and business travelers traverse the globe, some unknowingly carrying communicable diseases and passing them to others. Every week, understaffed city hospitals and village clinics in Africa, Asia, and Latin America—already battling AIDS, malaria, and pneumonia—must also cope with a rise in lung cancer and heart disease. Every month, pesticides and herbicides banned in the United States and Europe are sprayed on plants, trees, and flowers in Third World countries, putting the health of both workers and consumers at risk.

The purpose of Mount Sinai Global Health is to forcefully address these challenges with a sustained, coordinated, across-the-board plan of action encompassing education, research, and clinical practice that builds on Mount Sinai's unique strengths. By unifying the wide range of global health activities at Mount Sinai under one roof, combining innovative thinking with intellectual rigor, making maximum use of both human and technological resources, and giving equal weight to the demands of the present and the predicted needs of the future, we hope to create a successful model for global health programs around the world that can be sustained for years to come.

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Table 1

Key Driving Forces in Global Health.

Poverty
Educational inequities
Population growth
Urbanization
Growing inadequacy in the global health workforce
New and emerging infections
Global spread of the “Western” lifestyle
Global movement of hazardous industries and toxic chemicals
Climate change

Table 2

Global Health Fieldwork Preparatory Course.

Architecture
Requirement for all GHTC-sponsored trainees
Case-based interactive format
Takes the student from project inception through project implementation
Content
Conducting research in low-resource settings and IRB considerations
Community health needs assessment
Program planning
Common troubleshooting techniques
Focus group and survey designs
Community mapping
Data presentation

Abbreviations: GHTC, Global Health Training Center; IRB, institutional review board.