

Yale Public Health

SPRING 2011

Globally committed to health

A growing infrastructure | Urban unease | Team trials | On cancer's trail

Yale SCHOOL OF PUBLIC HEALTH



SPRING 2011

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Dean's Message

The importance of global health

This issue of *Yale Public Health* showcases the important research, education and service that the Yale School of Public Health is actively engaged in throughout the world. This work makes a significant difference in the lives and well-being of many. But as this issue goes to press, an intense debate continues in the U.S. Congress about the extent to which our government should fund international health programs and research.

Members of Congress and others ask why we should spend our limited resources abroad when we have so many pressing needs here. They wonder why global health matters.

It is a good question and one that requires a multifaceted response. One part of the answer is that global health is inevitably *our* health. Diseases today easily transcend international borders and, increasingly, oceans. An epidemic that starts in a rural village overseas can be in New York City or New Haven within days. The era of only localized epidemics is over. As a global community, we are interrelated as never before. The SARS outbreak in 2003 demonstrated the ease with which disease now breaches international boundaries.

It is also morally imperative that we help those in need. Simply put, helping people when and where we can is the right thing to do.

Furthermore, our work in other countries often has scientific and practical benefits at home. What we learn in foreign cultures and environments usually enriches our knowledge

of how to address our own domestic issues. Our experiences abroad often alert us to emerging health problems that will soon affect our country's population. For example, when we face challenges related to the prevention and treatment of HIV infection, whether it is in Africa, China, Russia or Latin America, we not only are helping to address the local need, but also are learning a great deal about current and potential issues that are applicable in the United States.

The term *global health* reflects how interconnected we have become as a planet, in disease and in health, and in so many other areas of importance.

In this issue we explore global health at Yale and some unique aspects of our program. We also highlight 10 current School of Public Health initiatives around the world—places as diverse as China, Colombia, Romania and Tanzania—that demonstrate the breadth and diversity of our global health mission.

I invite you to think about the significance of global health in these pages and in your own lives. It is imperative that the Yale School of Public Health, the academic community as a whole and our political leaders continue to support—and benefit from—our experiences and research throughout the world community.

*Paul D. Cleary, Ph.D.
Dean, Yale School of Public Health*

“One part of the answer is that global health is inevitably *our* health. Diseases today easily transcend international borders and, increasingly, oceans.”

Editor's Note

Healthier students in New Haven

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Dean

Paul D. Cleary, Ph.D.
The Anna M.R. Lauder Professor of Public Health

Managing Editor

Michael A. Greenwood

Web Coordinator

Denise L. Meyer

Copy Editor

Anne Sommer

Design

AH Design, Angie Hurlbut
NYM Design, Nilou Moochhala

Address correspondence to

Managing Editor, *Yale Public Health*
60 College Street
P.O. Box 208034
New Haven, CT 06520-8034
Phone: 203-737-5151
Fax: 203-785-7296
E-mail: michael.greenwood@yale.edu
Web: publichealth.yale.edu

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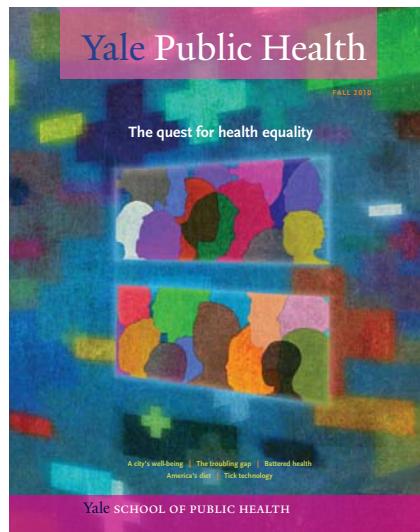


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An ambitious plan to improve eating habits and encourage other healthy behaviors was launched in several New Haven schools last fall – the beginning of a long-term, citywide effort by Yale's Community Alliance for Research and Engagement (CARE) to stem high rates of chronic disease in the city's underserved neighborhoods.

A story in the Fall 2010 issue of *Yale Public Health* ["A City's Well-Being"] outlined the extensive research that has been done to understand the extent and causes of disease and poor health in the Elm City in preparation for the start of grass-roots actions targeted at unhealthy lifestyles. Such behavioral changes are the goal of the final and most ambitious phase of the project, prompted by pronounced rates of obesity, diabetes, high blood pressure and other health problems.

Known as Health Heroes, the initiative's launch drew city, state and national political leaders; local educators; public health workers; and several area chefs who prepared healthy snacks for those in attendance. The ceremony, many hope, is the beginning of a

healthier future for New Haven's youth and its adults alike.

Health Heroes provides incentives for students to engage in healthier behaviors. It seeks to have them eat fruits and vegetables three times a day, participate in at least one hour of physical activity daily and get between eight and 10 hours of sleep nightly. The behaviors must be performed five days each week over a period of eight weeks. Students who complete the challenge will earn rewards and be recognized on their school's Hero Wall of Fame.

"This is an important next step in our partnership with the New Haven Public Schools. We are moving from evidence to action," said Jeannette R. Ickovics, Ph.D., professor in the division of Chronic Disease Epidemiology and CARE's director.

Funded with \$25,000 from CARE, four K-8 schools in the city are participating in the pilot program, said Susan Peters, A.P.R.N. '97, M.P.H. '97, who is the senior program director for CARE and is leading the school initiatives. If successful, Health Heroes will be expanded to other city schools. In addition, CARE will initiate other programs targeting students and other segments of New Haven's population.

Superintendent of Schools Reginald Mayo noted that a healthy diet and lifestyle are essential to successful learning. "If young people are hungry, they are not able to focus," he said. "If they are not able to focus, they are not able to learn."

Michael Greenwood

Managing Editor

Advances



Gordon Studer

Online networks have small effect on health quality

While heart attack care has improved dramatically in the past few years, the use of online networks to foster communication and exchange information amongst hospitals and physicians has played a minor role in this success.

The Door-to-Balloon (D2B) Alliance, a national campaign that sought to reduce the time in which heart attack patients receive lifesaving treatment in the emergency room, has resulted in hundreds of hospitals nationwide markedly reducing treatment times – and saving lives – through a variety of strategies.

But the use of a campaign-sponsored online community by staff at participating hospitals has played a negligible role in this success. Yale researchers surveyed member hospitals and analyzed their online postings for content and usage patterns to determine the effect on their D2B outcomes.

Although 62 percent of the D2B users reported that the online community helped their quality improvement efforts, the network's impact on treatment times was statistically insignificant. "This suggests that the benefits are intangible or not directly linked to performance. For example, it may be that a key benefit of learning networks is social support, which may

not directly translate into performance improvement, yet is valued by participants," said lead author Ingrid Nembhard, Ph.D., assistant professor in the division of Health Policy and Administration. "Our study suggests that more research is needed to understand the scope of benefits that users derive from online communities."

Denise Meyer

Insulin levels and breast cancer survival linked

Women treated for breast cancer who have elevated levels of circulating insulin face substantially higher mortality rates than their peers with lower levels.

New research by the Yale School of Public Health has found that patients with amounts of an insulin marker known as C-peptide greater than 2.5 ng/ml were at a twofold-higher risk of breast cancer death than women with C-peptide levels lower than 1.7 ng/ml.

The association between C-peptide levels and death from breast cancer was even more pronounced in certain subgroups, including women with type 2 diabetes.

The findings suggest that treatment strategies that reduce C-peptide levels in women treated for breast cancer – such as diet-induced weight loss, increased physical activity and insulin-lowering medications – should be explored, said lead author Melinda L. Irwin, Ph.D., associate professor in the division of Chronic Disease Epidemiology and co-director of the Cancer Prevention and Control Research Program at the Yale Cancer Center.

"There is growing evidence that weight and physical activity affect breast cancer outcomes, and our findings suggest that the mechanism linking lifestyle factors and breast cancer may be the insulin pathway," Irwin said. "Our findings are timely, in that therapeutic trials of insulin-lowering medications in women treated for breast cancer are currently being conducted."

Irwin added that previous research showed that a daily brisk walk decreased insulin levels, and she recommended that breast cancer patients who are overweight or not currently exercising seek lifestyle counseling and/or talk with their physician about additional therapeutic options.

Michael Greenwood



Hospice saves money, reduces hospitalizations

The cost of care for cancer patients who disenrolled from hospice care was nearly five times higher than that for patients who continued with hospice care.

Researchers at the Yale School of Public Health and Mount Sinai School of Medicine also found that patients who disenroll are also far more likely to require emergency department or intensive care unit (ICU) care and to be hospitalized.

"This is particularly important, given the latest evidence that cancer patients who die in ICUs and hospitals experience far more physical and emotional distress than patients who die at home with hospice care," said Elizabeth H. Bradley, Ph.D. '96, professor in the division of Health Policy and Administration and the paper's senior author. "For decades, we have seen better outcomes for patients and families who use hospice care, but here we also find clear evidence in a group initially using hospice that leaving hospice care is also costly financially."

The research team evaluated data from 90,826 patients with cancer who were served by 1,384 hospices between 1998 and 2002. They found that nearly 11 percent of the patients who disenrolled from hospice care had considerably higher health care use and costs than those who continued hospice care until death.

The research also found that 33.9 percent of the patients who had disenrolled from hospice care were admitted to an emergency department, compared with only 3.1 percent of those who remained in hospice care until death. Meanwhile, patients who continued hospice care incurred, on average, \$6,537 in expenses from the time of hospice enrollment until death, while those who disenrolled incurred, on average, \$30,848 in expenses.

M.G.



Francesco Bongiorni

Unhealthy weight patterns during pregnancy identified

Excessive weight gain during pregnancy and inadequate postpartum weight loss are particularly prevalent among low-income, ethnic minority women.

Such patterns have important public health implications, according to researchers at the Yale School of Public Health, including reduced fetal growth and greater likelihood of preterm delivery and injury during birth. Mothers who retain weight after giving birth are more likely than their peers to develop a range of serious health conditions, including cardiovascular disease, hypertension and diabetes.

The Yale study followed 427 women, ranging in age from 14 to 25 years, during their pregnancies through 12 months postpartum. The researchers found that 62 percent of the women – particularly those who were already overweight or obese – exceeded the recommended weight gain. Only 22 percent of the women gained weight within recommended guidelines.

The study also found that one-third of the participants had a higher body mass index (BMI) one year after

giving birth and that 68 percent were either overweight or obese. There was also a noticeable shift toward obesity. Five percent of the women classified as having normal weight and 53 percent of those classified as overweight before pregnancy were classified as obese one year postpartum. The authors note that a shift in BMI that is seen after just one pregnancy is likely to be compounded with future pregnancies.

"Pregnancy is a pivotal point for weight management. To promote good health, we must consider pregnancy a 'window of opportunity' for interventions to improve weight management," said senior author Jeannette R. Ickovics, Ph.D., professor in the division of Chronic Disease Epidemiology and director of the Social and Behavioral Sciences Program.

M.G.

Overweight women have heightened risk of STIs

Young, overweight women are at significantly heightened risk for sexually transmitted infections (STIs) and are more likely to engage in risky sexual behaviors than their more slender peers.

YSPH researchers examined the influence of a woman's body mass index on her likelihood of engaging in sexually risky behavior (e.g., having unprotected sex or having multiple or casual partners) and of contracting an STI. The study included 704 mothers from New Haven and Atlanta.

They found that overweight mothers between the ages of 14 and 25 are nearly 80 percent more likely to have an STI and 64 percent more likely to engage in risky sexual behavior than their normal-weight peers.

Additionally, the study found that young mothers who are classified as obese, rather than overweight, are less likely to have STIs than their normal-weight peers.

“Researchers tend to focus on one health problem or another, without thinking about how health behaviors may relate and how common risk and social factors play a role across a wide spectrum of health outcomes,” said lead author Trace Kershaw, Ph.D., associate professor in the division of Chronic Disease Epidemiology.

Even though excess body weight and sexual risk are pressing public health issues among young people today, there has been relatively little research on how and why these issues are linked.

Michael Greenwood

Regular exercise found to reduce cancer risk

Women who routinely perform moderate- to vigorous-intensity exercise for 2.5 hours or more per week have a significantly reduced risk of endometrial cancer.

The YSPH-led research examined hundreds of women and found that those who exercised at least 150 minutes weekly—which could be something as simple as moderate-paced walking—had a 34 percent reduced risk of endometrial cancer compared with their sedentary peers.

This association was particularly pronounced among active women with a body mass index (BMI) less than 25; these women had a 73 percent lower risk than inactive women with a BMI greater than 25. Although BMI showed



a strong association with endometrial cancer, women who were overweight but still active had a 52 percent lower risk of endometrial cancer than their overweight but inactive peers.

While previous research has found a similar link between exercise and endometrial cancer risk, the Yale study examined physical activity measures in more detail and looked at joint associations of BMI and physical activity.

“These findings show the importance of physical activity in reducing the risk of endometrial cancer,” said Hannah Arem, a YSPH doctoral student and one of the paper’s authors.

Twenty-nine activities were identified, and the intensity and frequency were measured on a standardized scale.

The relationship between endometrial cancer risk and physical activity involves sex hormones and insulin pathways, with reductions in the percentage of body fat being a major biological factor. There are approximately 43,000 new cases of endometrial cancer in the United States each year.

M.G.

Method predicts risk of invasive breast cancer

Yale scientists have discovered a way to predict whether women with ductal carcinoma in situ (DCIS)—the most common form of noninvasive breast cancer—are at risk of developing more invasive tumors in later life.

The finding will allow women with DCIS to be more selective about their course of treatment and, potentially, to avoid aggressive treatments such as complete mastectomy.

“With these findings, a patient will be able to assess her risk of subsequently developing invasive cancer or not developing further tumors,” said Annette M. Molinaro, Ph.D., assistant professor in the division of Biostatistics and one of the study’s lead authors.

The YSPH study followed the medical histories of 1,162 women who were diagnosed with DCIS and treated with lumpectomy. The researchers found that two factors were predictors of the risk of developing invasive cancer within eight years after being diagnosed with DCIS: the method of detection and the expression of several biomarkers.

The study also found that different combinations of biomarkers measured on the initial DCIS tissue were associated with varying levels of risk of invasive cancer.

DCIS rarely leads to death from breast cancer. But women diagnosed with DCIS have historically had an inaccurate perception of their risk of later developing invasive cancer and, as a result, have chosen fairly aggressive treatments.

M.G.

From clean water to HIV to the need for developing in-country research capacities, there is no shortage of global health issues on the horizon.

Stronger health systems

The last decade has seen large increases in funding for health in the developing world, but health systems in many sub-Saharan African countries remain weak and fragmented. While this increase in resources has been welcomed, most funding has gone to priority single-disease programs, notably malaria, tuberculosis and HIV/AIDS. The impact of such disease-specific approaches on health systems is mixed, and where parallel structures are already in place, the result is duplication and inefficiency, not strengthening.

For all these reasons, a growing number of global health actors are supporting a shift from single-disease programs to an emphasis on strengthening health systems. Such approaches typically focus on improving physical infrastructure; developing and providing products, vaccines and technologies; creating and improving information systems; and training health care workers. Unfortunately, leadership and governance challenges have been largely overlooked, despite the fact that it is precisely a lack of leadership that often causes programs to fail. After all, it takes people – and only people – to deliver proven effective interventions. And the people and processes of a health system are far more complex, and more complex to deal with, than products alone. That's why leadership is critical.

— Cassie Toner, M.P.A., Program Associate for African Health, and Mary Bassett, M.D., M.P.H., Director of the African Health Initiative, Doris Duke Charitable Foundation

Water: A global health priority

Water is life. This statement holds particular significance in the Azawak region of West Africa, where it is a daily struggle to find even a drop of water for over nine months a year.

Outside of the two-month rainy season, the 500,000 inhabitants of this area travel as far as 50 kilometers in a day searching for water. This dire situation has been exacerbated



by climactic conditions, with the rainy season shortening every year and surface water becoming more and more scarce. Underground water reserves lie at 200 to 900 meters, too deep to reach without sophisticated and expensive mechanical equipment. With often less than a few liters of contaminated water to use a day, one out of two children dies before age 5, a majority due to water-related illness.

The Azawak communities are far from alone in facing what has today become a global water crisis. Nearly 2 billion people worldwide strive to survive without reliable access to this most basic resource.

But there is hope. Studies indicate that \$10 billion dedicated yearly to address the global water crisis would drastically improve access to clean water worldwide. And the benefits would extend far beyond improved health. Once again, the Azawak stands as an example. Thanks to deep bore-hole wells built by the not-for-profit

Amman Imman: Water is Life in several communities of the region, child morbidity and mortality have declined dramatically, and agricultural and livestock production, health establishments and schools are all benefitting.

— Ariane Kirtley, M.P.H. '04, Founder and Executive Director of Amman Imman: Water is Life

The critical need for research capacity

In order for us to improve the health of the world's poorest people over the long term, it is absolutely critical that we develop local research capacity.

Only when low- and middle-income countries are able to take ownership of their most pressing health issues and solve their own problems will our aid efforts become fully successful. Health research in the 21st century is increasingly a team effort requiring multidisciplinary expertise. We must provide rigorous training across disciplines to spur discoveries such as low-cost diagnostics and cost-effective methods of preventing and treating disease. By bringing together experts in engineering, business, computer science,

communications and law with the more traditional public health practitioners, we can speed progress on global health issues.

We must also do a better job of addressing the enormous gap between health discoveries and their delivery to communities. By providing local scientists with the skills to employ implementation science, new treatments and approaches can be more quickly and effectively adopted to work in the local culture and context.

Finally, it is vital that we nurture local expertise so that developing countries are prepared to address the rising tide of death and disability caused by chronic illnesses. It is a daunting task. The World Bank predicts that, if no action is taken, some 388 million people worldwide will die prematurely from cardiovascular disease, diabetes and cancer. Although more than 5,000 scientists worldwide have been trained through the Fogarty International Center programs over the last four decades, many of the world's poorest regions still lack basic health care and public health scientists.

— Roger I. Glass, M.D., Ph.D., Director of the Fogarty International Center and Associate Director for International Research, National Institutes of Health

Leveraging research investments

With funding from public, private and charitable sources, academic institutions have created a vibrant research enterprise that continues to contribute important knowledge to the goal of improving health.

Now research funders and academic institutions face a new challenge — how to leverage this research investment into realized health benefits. According to Research!America, federal and state governments and non-profit organizations in the United States spent more than \$64 billion on medical research in 2009. Yet we all know the disheartening facts about the health status of Americans — we rank 39th in the world for infant mortality, 43rd for adult female mortality, 42nd for adult male mortality and 36th for life expectancy. It's not that we don't know how to improve our public health, but we don't do a good job of scaling up those things that work. And this is not

true just in the United States; globally we must also do a better job of getting evidence-based practices into common practice.

Usually at this point in the discussion, the blame is often turned toward universities with complaints of out-of-date promotion policies and an emphasis on "novel" over "useful." Yet, the philanthropic sector needs to accept that its own practices may also create barriers to scaling up.

As funders, we can't just complain that our investments don't get scaled up; we have to work with our university partners to create a better model for research so that it may more effectively fulfill the promise of improving health.

— Lynne Garner, Ph.D., Trustee and President of the Donaghue Foundation

Sustaining political commitment

Extraordinary gains have been made in global health, notably in the fight against AIDS, tuberculosis and malaria, over the last decade. Millions of people have gained access to treatment and prevention for these three major diseases because, 10 years ago, leaders in both the global north and south made strong political commitments to act. Civil society organizations have mobilized global public opinion in favor of tackling intolerable inequities in health care that exist between rich and poor countries. And unprecedented financial resources have become available from donor countries — especially members of the G8 — as well as the private sector, foundations and innovative financing mechanisms.

The challenges for global health in the next decade include sustaining political commitment in the face of competing priorities and ensuring the longer-term sustainability of programs, through such avenues as continued donor support, increased domestic investment and further innovation in health financing. We must also continue to address weaknesses in health systems, such as human resources and capacity deficits; further increase the participation of civil society and the private sector in health policy and delivery; ensure that investments in fighting disease leverage the broadest possible benefits — for example, in maternal and child health; and act to protect and promote the human rights of the most vulnerable.



Financing from the Global Fund to Fight AIDS, Tuberculosis and Malaria is supporting AIDS treatment for 3 million of the 5.2 million people currently being treated in developing countries; many millions more are accessing HIV prevention with Global Fund support.

These investments and others are reducing morbidity and mortality, strengthening health systems and improving the lives of women and children in many countries.

— Michel Kazatchkine, M.D., Executive Director of the Global Fund to Fight AIDS, Tuberculosis and Malaria

The continuing challenges of HIV/AIDS

The broad-ranging social and economic costs of HIV/AIDS have long been known. Researchers, however, express concern that the actual costs may still be understated. At the same time, the preponderant burden of this pandemic is borne by highly vulnerable populations in low-income countries. The persistent, debilitating effects of HIV exacerbate poverty, further limiting access to, among other things, food, health care and education.

For 50 years, the language, cultural and technical training that Peace Corps volunteers receive has equipped them to reach isolated communities in low-income countries. In 2010, 1,900 of 8,655

Peace Corps volunteers serving abroad had primary assignments in the health sector. More significantly, because of the Peace Corps' focus on HIV/AIDS, nearly 40 percent of all volunteers conducted HIV-related activities as part of their project work last year.

The agency's HIV work is undertaken in conjunction with the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). As PEPFAR transitions from an emergency response to one focused on sustainability, the Peace Corps can play an even more significant role because its expertise in grass-roots capacity building and sustainable social mobilization targets major PEPFAR goals.

The Peace Corps remains committed to meeting the continuing challenges of HIV/AIDS by developing educated, seasoned public health practitioners abroad and at home.

— Julie Driver, Program Manager of the Peace Corps Fellows/USA Program



A cleaner, healthier environment

The relationship between human health and the environment is significant and rapidly evolving. The environment is a key determinant of health, and exposures to toxic chemicals, physical pollutants, biological agents and unsafe surroundings have an impact on disease burden and quality of life.

Environmental health involves the assessment and control of all of the biological, chemical and physical factors external to individuals and the impact that these factors have on population health and illness. Increasingly, environmental health is global in scope due to

diminishing boundaries; increasing population size; and international problems, such as climate change.

Exposures to environmental pollution remain a major source of health risk throughout the world, though risks are generally higher in developing countries, where poverty, lack of investment in modern technology and weak or nonexistent environmental regulations lead to high levels of environmental pollution. Unsafe water, poor sanitation and poor hygiene are major sources of exposure, along with indoor and ambient (outdoor) air pollution, occupational exposures, vector-borne diseases, toxic waste, contaminated food supplies and safety hazards leading to unintentional injuries. Inadequate nutrition and health care, increasing urbanization, natural resource depletion and deterioration of natural ecosystems are important factors that relate to environmental-disease risk.

Associations between environmental pollution and health outcomes are complex and often poorly characterized. Levels of exposure are often uncertain or unknown, as a result of the lack of detailed environmental monitoring and temporal and spatial variations within and between populations. Certain groups, such as children, pregnant women and the elderly, may be particularly vulnerable.

— Adrienne S. Ettinger, Sc.D., M.P.H., YSPH Assistant Professor in the division of Chronic Disease Epidemiology



GLOBALLY ENGAGED

While illness and disease remain pervasive around the world, an expanding global health movement at Yale and other universities is working to build a better future for all.





People congregate at a busy market in Kofele, a rural town in southern Ethiopia. The Global Health Leadership Institute at Yale is working to strengthen health centers and hospitals in the region.



By Michael Greenwood

An assessment of the world's health in 2011 reveals troubling trends.

Communicable diseases continue a steady march—HIV, malaria and tuberculosis, to name but a few—followed by a tide of chronic disease, including obesity, cardiovascular ailments and diabetes. Rates of maternal mortality remain alarmingly high in many countries, and newborns continue to suffer from low birth weight, poor nutrition and premature—though often preventable—death.

Changing climate patterns, earthquakes and floods further exacerbate poverty, adding to the world's health woes. And rapid population growth contributes to widespread health disparities around the globe. The population now numbers around 7 billion people (a marked increase in just 50 years) and is projected to top 9 billion by mid-century. More people are migrating to the megacities that dot the globe, places where poverty, poor sanitation and disease are oftentimes already rife.

Human health, in short, is an epic problem, one that increasingly demands international attention.

Yet, as dire as today's circumstances are, there are reasons for optimism. A global health wave—even a revolution—is swelling and fundamentally changing the way in which health care, disease and research are addressed in some of the globe's most isolated regions. The United Nations, for example, has established a series of targets to dramatically improve global health outcomes by 2015 (see sidebar on page 15).

The movement can also be seen at the highest levels of our government (as evidenced by multibillion-dollar initiatives to promote health), among influential and wealthy benefactors (e.g., William Clinton and Bill Gates), in popular culture (e.g., Bono and Angelina Jolie) and—perhaps most vitally—at an increasing number of U.S. universities such as Yale, where global health programs are growing and future leaders are being trained to address what is arguably the century's most pressing and complex challenge.

Expanding infrastructure

Global health initiatives at Yale take many forms.

There is a Global Health Concentration, the Global Health Leadership Institute (GHLI) and the Global Health Initiative (GHI). There are Global Health Fellows, an array of global health training programs in countries as diverse as Great Britain and China and a lengthy menu of global health courses taught not only by faculty at the School



"I think that we have created fertile ground at Yale for global health."

— Michael Skonieczny

of Public Health but also by faculty in political science; anthropology; and women's, gender, & sexuality studies, among others. Recently, a student-run global health film festival debuted to promote further awareness.

Elizabeth H. Bradley, Ph.D. '96, professor in the division of Health Policy and Administration, is an architect of much of this growth. A former hospital administrator at Massachusetts General Hospital, Bradley's path to public health, and now global health, started with an interest in how improvements in hospital management and administration (also known as hospital strengthening) can result in measurable gains in patient outcomes.

Today, Bradley directs both the GHLI and the GHI and travels widely and regularly to grow Yale's global health network. Working with colleagues and through partnerships with government ministries, nongovernmental organizations, influential individuals and private business (including a former U.S. president and one of the world's largest banks), Bradley has helped to develop and implement training programs in a growing number of countries. These programs, in turn, are producing cadres of in-country professionals skilled in the latest health practices and ready to address their home countries' most pressing needs.

In Ethiopia, for example, there have been notable strides in health care despite a paucity of resources and prevailing poverty. Under the direction of the Ministry of Health in this country, there have been substantial efforts to improve health outcomes. In the last five years, the number of malaria deaths has dropped; more people with AIDS are receiving treatment; thousands of new health clinics have been constructed throughout this expansive country; and tens of thousands of additional health care workers have been trained to staff them.

This global health success story resulted in part from a partnership between the Ethiopian government and the William J. Clinton Foundation, which shared a desire and a commitment to improve the country's health care. But an important element was missing: expertise in the critical field of hospital strengthening — Bradley's forte. Enter Yale and the beginning of a fruitful and growing collaboration that continues to this day.

"Partnering with the Clinton Foundation enabled us to create a master's program in hospital and health care administration, the only program of its kind in sub-Saharan Africa," explained Bradley. "Our partnership in Ethiopia, which also includes the Centers for Disease Control and Prevention, will have a significant impact on improving health care services to Ethiopia's 76 million people."



Carl Kaufman

Albert Ko, head of the division of Epidemiology of Microbial Diseases, participates in a recent symposium on how Yale researchers can work across academic disciplines to more effectively address pressing global health problems.

The concrete progress in Ethiopia has since resulted in other global health partnerships for Yale. Today the GHLI has a program in China (see story on page 26), where women are being trained to become the next generation of hospital administrators in this country's enormous health system. Other programs are also under way in South Africa, the United Kingdom, Egypt and Liberia. Indeed, Liberia's president, Ellen Johnson Sirleaf, recently credited Yale with being "instrumental" in supporting improvements to her country's health system. Future health initiatives in other countries, such as Rwanda, are now under consideration.

"I think that we have created fertile ground at Yale for global health," said Michael Skonieczny, the GHLI's executive director. "With strong support from students and faculty, we will continue to build global health at Yale."

This support comes in many forms, including original global health research that further enhances the understanding and practice of this still-emerging field and benefits the university's various initiatives. Yale, for example, has pioneered the use of grand strategy as a global health tool and is applying it to deeply rooted health problems. A tactic traditionally used by heads of state, grand strategy is the study of how to accomplish great ends (in this case healthy populations) despite limited means (such as a shortage of trained professionals). The Marshall Plan that rebuilt much of Europe amid the ruins of World War II is a prime example of grand strategy in action. It happens that this approach dovetails almost perfectly with global health, as global health's goals are almost always grand and resources are usually scarce.

"Global health is increasingly recognized as a central aspect of international relations and economic development, and the application of grand strategy becomes more



critical," said John L. Gaddis, Ph.D., the Robert A. Lovett Professor of History and Distinguished Fellow in Grand Strategy at Yale. "Our collaboration with Dr. Bradley and her colleagues at the GHLI has been an important example of how grand strategy can offer unique contributions to improving the health of people around the globe."

Leslie Curry, M.P.H., Ph.D., a research scientist and lecturer in the division of Health Policy and Administration and the lead author of a recent paper on the topic, noted that if properly applied, grand strategy can make a noticeable difference in global health outcomes, like saving the lives of many mothers and infants.

Yale also relies on identifying successful in-country health practices and then helping the country leadership to implement these practices broadly, sometimes on a countrywide scale. This approach, known as "positive deviance," uses health practices that deviate from the norm in a positive direction (see story on page 30). A particularly successful practice at a clinic in the suburbs of Addis Ababa, for instance, might hold the key to improving health outcomes nationwide.

Targeting issues

But other global health problems remain largely neglected, and innovative strategies are needed if health gains are to be achieved.

A recent symposium drew dozens of Yale researchers from various academic specialties who began looking at ways to work together (combining, for instance, the disciplines of economics, genetics and nutrition) toward the goal of making more tangible advances. Such trans-disciplinary collaboration is critical, researchers maintain. Today's global health problems are too intricate and widespread to be solved by even the most skilled group of epidemiologists or medical researchers alone.

In particular, the symposium explored the following global health dilemmas and ways in which Yale might move forward in addressing them:

- Food insecurity and obesity—Some 1 billion people worldwide are now considered overweight or obese.

These conditions contribute to alarming rates of chronic disease in developed and developing nations alike. In addition, higher food prices are increasing food insecurity, further compounding issues for 1 billion undernourished people, as well as driving unhealthy eating habits that can lead to obesity. Paradoxically, increasing rates of food insecurity and obesity often exist side by side.

Driving factors

Global health programs on American campuses have expanded rapidly, spurred by student demand and a growing realization that the world's health systems are interconnected.

In recent years the term *global health* has grown increasingly mainstream, even becoming a household term. Global health stories are displayed on the covers of prominent magazines, and the influential journal *The Lancet* declared that the terms *public health* and *global health* are synonymous.

How has this come about?

An important factor is the rapid growth of global health programs on American campuses, spurred by the enthusiasm of the current generation of college students. Influenced by widely diverging factors — among them 9/11, two prolonged American wars, the power of the Internet and the examples set by cultural icons — student interest in global health has grown steadily.

Karen Payne (right), a second-year M.P.H. student at Yale, reviews test results with a colleague in Cali, Colombia. Payne's summer internship focused on developing a rapid and sensitive serological test for the detection of cutaneous leishmaniasis.



Courtesy of Karen Payne

Kaveh Khoshnood, M.P.H. '89, Ph.D. '95, assistant professor in the division of Epidemiology of Microbial Diseases, works closely with many students interested in global health and has found that while they are motivated by various and personal reasons, they all share a desire to make a tangible difference in the lives of people across the globe.

"There's a sense that there's something deeply wrong in the world," said Khoshnood. "Younger people are saying, 'I need to understand the world ... and do something about it. I need to help fix that.'"

Before coming to Yale, Benjamin T. Simms, an M.P.H. candidate, was a Peace Corps volunteer in Costa Rica, where he worked with young people in a mountain village and where, for the first time, he saw unique infectious diseases and the challenges faced by community members seeking access to proper health services.

"Without a doubt, the two years that I spent in [the village of] Ujarras bred my interest in global health and inspired me to obtain an M.P.H.," he said.



Fellow M.P.H. student Geetanjoli Banerjee, also a former Peace Corps volunteer, was stationed in South Africa. The overseas experience left Banerjee wanting to learn more so that she could make a more meaningful contribution in the future.

"It is my hope that I end up working in women's health in developing countries and chipping away at big problems, little by little," she said.

Another factor that has raised the profile of global health is the generous financial commitments made by governments in the United States and beyond, private entrepreneurs and philanthropists. Organizations such as the President's Emergency Plan for AIDS Relief (PEPFAR); the Bill and Melinda Gates Foundation; and the Global Fund to Fight AIDS, Tuberculosis and Malaria, to name only three, have jointly spent tens of billions of dollars to promote global health.

One motive is clearly ethical: helping people and populations in distress is the right thing to do. But there are practical considerations as well. We live in an age where health problems can no longer be contained.

John D. Negroponte, a former U.S. ambassador to Iraq, recently spoke to a small gathering of Yale public health students about the importance of promoting health throughout the world.

But, he cautioned, there are also constraints on what a government, even one with as many resources as the United States, can do.

Some 50 universities in the United States and Canada alone, Yale among them, now belong to the Consortium of Universities for Global Health and have active global health programs or are developing them. The group was formed to harness, develop and promote global health training.

But challenges abound if interest in global health is to remain vibrant and sustainable on American campuses. One test is for leaders at individual universities to convince colleagues from diverse disciplines that global health is an endeavor that requires their input. Beyond that, students entering the field need to have defined and developed career paths. Another concern is maintaining the current momentum and excitement surrounding global health, even as the economy struggles and budgets are notched tighter.

If these, and other challenges, are successfully met, universities are positioned to play a critical role in addressing the world's health challenges, the Center for Strategic and International Studies concluded in a recent report.

"Universities are poised to change the landscape of global health," the report said, "and ultimately improve the human condition." **YPH**

For more information on global health efforts at Yale, visit yale.edu/ghli/ and ghi.yale.edu/.

- Global infectious diseases—Tuberculosis, HIV, hepatitis and other infectious diseases remain serious health risks throughout the world. In some cases, one epidemic interacts with another, creating a syndemic that poses new health threats to people and new research dilemmas for scientists. Investigators are exploring ways to create an infectious disease research environment at Yale that spans disease interests.
- Conflict, resilience and health—Exposure to armed conflict, civil strife and violence in general has untold effects on the physical and emotional health of many, though some communities, households and individuals exhibit a resilience that allows them to endure adversity and maintain relatively healthy functioning. With increasing numbers of populations throughout the world directly witnessing and experiencing violence, how the world community can respond is a growing global health question.
- Innovation and scale up—Examples abound of relatively inexpensive and cost-effective technologies and behavioral remedies that would improve health but are not widely adopted. Why? Barriers to "take-up" can be looked at from both the demand and supply sides. Consumers may lack resources to adopt the innovation or information that would lead them to it; a household's decision maker may have different priorities from those of his or her spouse; or the "innovation" may not be in accord with a particular culture's taste or tradition.
- Climate change—Global climate change has the potential to influence virtually all aspects of human health. One of the most pressing questions is how to assess and predict vulnerability to global climate change, which will have complex effects on interdependent ecological and social systems at the local, regional and global levels over many centuries. It is hoped that a new federal work group on climate change and health will facilitate funding and examine these problems from a multidisciplinary perspective.

"These five areas of global health, of enormous importance in developed and developing countries alike, are inextricably interrelated," said Robert Dubrow, M.D., Ph.D., associate professor in the division of Chronic Disease Epidemiology and a member of the GHI Faculty Advisory Committee. "Thus, global climate change may have a profound influence on the epidemiology of infectious diseases and may place tremendous stress on the world's supply of food and fresh water, heightening food insecurity and leading to armed conflict between nations. Innovation and



scale up will be required for climate change mitigation and adaptation. Multiple disciplines will need to work together to solve these daunting global health challenges."

Tomorrow's health

Creating solutions for today's global health issues is sometimes accomplished one step at a time.

At the most recent GHLI leadership conference, Juliet Mbabazi, a pharmacist from Rwanda, related how her nation needs to train more skilled health care workers to improve patient care in a country that is emerging from years of civil strife.

To make this happen, Rwanda needs to build up its residency programs. This requires more medical equipment and other resources. Rwanda's first magnetic resonance imaging machine arrived only recently, and work to connect the entire country to the Internet is ongoing, she said.

"Our country is starting from zero," Mbabazi told the gathering. "But we are getting there."

Yale sponsors the annual conference (a signature event of the GHLI) to support health professionals from developing countries that are committed to improving the quality of health care for their citizens. The delegates travel to New Haven to work with Yale experts and others on some of their most intractable health problems and to develop the leadership skills to put their ideas into action.

For the balance of the conference, Mbabazi and the other members of her delegation refined their strategy to expand the number of health care workers in a nation with relatively few health professionals and a growing population.

Delegates from Ethiopia, Liberia and Ghana, meanwhile, simultaneously worked on plans to address their own respective health care problems. Each day, the delegations worked individually and then convened for lively discussions on obstacles to good health care, strategies for achieving it and the successes and failures they have experienced along the way. Within days, partnerships were forming.

By week's end, each delegation had honed its action plan and presented an outline to the attendees at the Greenberg Conference Center. The goal for each group upon returning home was to begin implementing their plans.

Tedros Adhanom Ghebreyesus, Ph.D., Ethiopia's Minister of Health, traveled to Yale for the conference's closing ceremonies and was optimistic that what his colleagues had started at Yale would eventually result in further health care improvements for Ethiopia's people.

"I hope what Yale has started will grow," Ghebreyesus said of the training program. "We've learned a lot from all of you." **YPH**

The Millennium Development Goals

The United Nations has established a series of ambitious goals to address some of the world's most pressing health, social and development problems and is looking to achieve them by 2015.



Goal 1:
Eradicate extreme poverty and hunger.



Goal 2:
Achieve universal primary education.



Goal 3:
Promote gender equality and empower women.



Goal 4:
Reduce child mortality.



Goal 5:
Improve maternal health.



Goal 6:
Combat HIV/AIDS, malaria and other diseases.



Goal 7:
Ensure environmental sustainability.



Goal 8:
Develop a global partnership for development.



A Tuareg nomad woman travels over 20 miles to fetch water for her family from a 600-foot-deep borehole well that was built by Amman Imman: Water is Life in the village of Kijigari, Niger. The organization was founded by YSPH alumna Ariane Kirtley.



A GROWING

Global health training at Yale takes many forms, including graduate and undergraduate programs, international seminars, spring break in El Salvador and a host of other opportunities.

By Denise Meyer

48

YSPH internships abroad in 2010

“I know that advances in public health at Yale will have a direct impact on human health, particularly that of the world’s most vulnerable individuals and populations.”

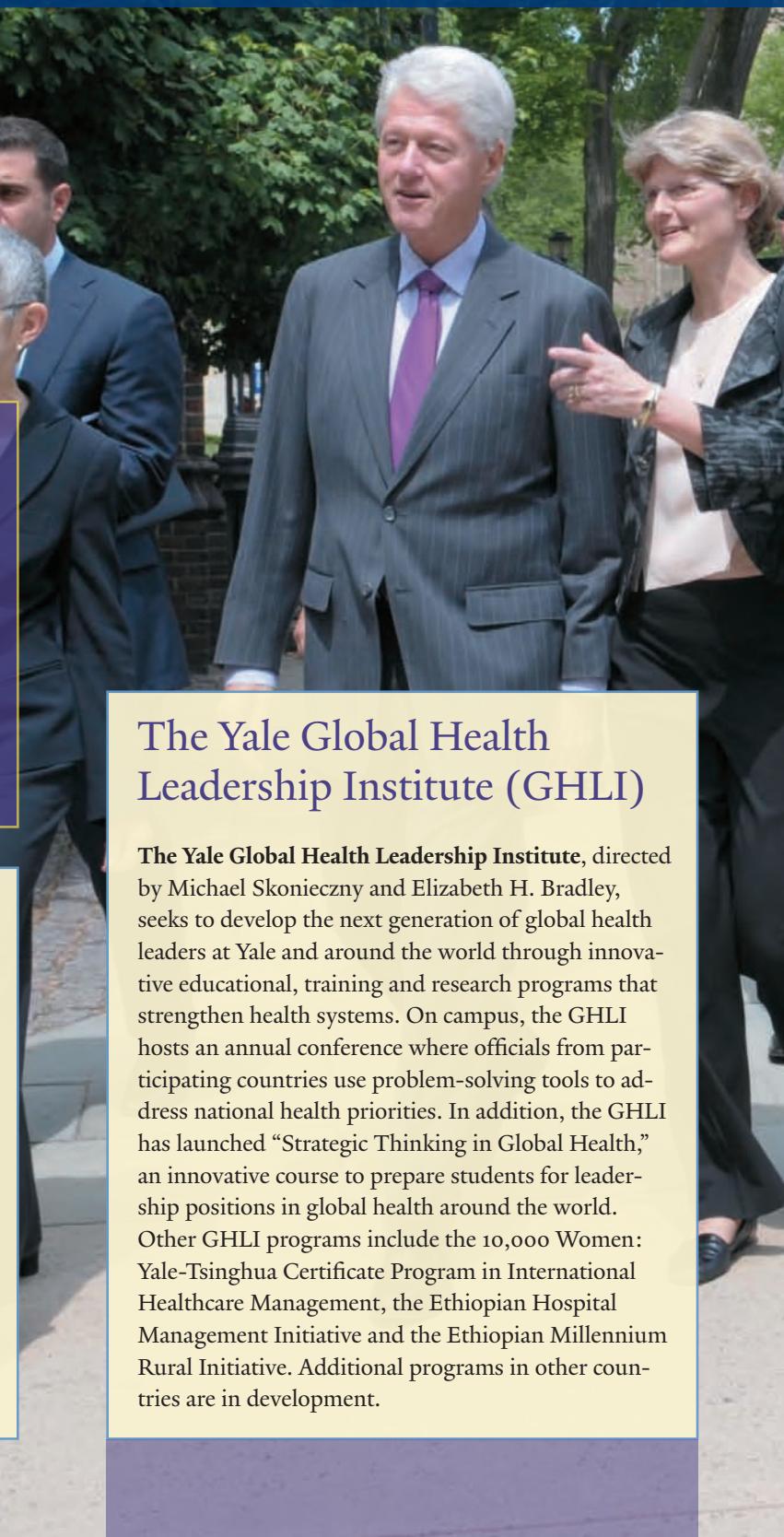
— Richard Levin, president of Yale

The Yale Global Health Initiative (GHI)

The **Yale Global Health Initiative**, directed by Elizabeth H. Bradley, professor at YSPH, is a major initiative of the Jackson Institute for Global Affairs at Yale and serves as an umbrella for faculty and students from across the university. The GHI has fostered the development of more than a dozen new global health courses as well as a Global Health Certificate program for graduate students and the Global Health Fellows Program for undergraduates. Overseen by Kaveh Khoshnood, assistant professor at YSPH, the Fellows Program provides 20 funded internships for program participants.

The Yale Global Health Leadership Institute (GHLI)

The **Yale Global Health Leadership Institute**, directed by Michael Skonieczny and Elizabeth H. Bradley, seeks to develop the next generation of global health leaders at Yale and around the world through innovative educational, training and research programs that strengthen health systems. On campus, the GHLI hosts an annual conference where officials from participating countries use problem-solving tools to address national health priorities. In addition, the GHLI has launched “Strategic Thinking in Global Health,” an innovative course to prepare students for leadership positions in global health around the world. Other GHLI programs include the 10,000 Women: Yale-Tsinghua Certificate Program in International Healthcare Management, the Ethiopian Hospital Management Initiative and the Ethiopian Millennium Rural Initiative. Additional programs in other countries are in development.



movement

“I hope what Yale has started will grow. We’ve learned a lot from all of you.”

– Tedros Adhanom Ghebreyesus, Ethiopian Minister of Health



400
Downs Fellowships awarded

Public health Professor Elizabeth Bradley (center) shares a thought with former President William Clinton and Yale President Richard Levin during the 2010 Commencement. Bradley works closely with the William J. Clinton Foundation on global health initiatives.



The Global Health Concentration (GHC)

The Global Health Concentration allows M.P.H. students from any division to broaden their studies with a global perspective. Retooled for the 2009-2010 academic year, the Global Health Concentration enrolled 27 percent of the first-year class. In addition to coursework, the Global Health Seminar, global health internship and thesis or capstone project prepare students for careers in global public health practice and research, whether in private, national, bilateral or multilateral organizations around the world. The GHC’s seminar series is popular among students from across the medical campus.

Downs International Health Student Travel Fellowship

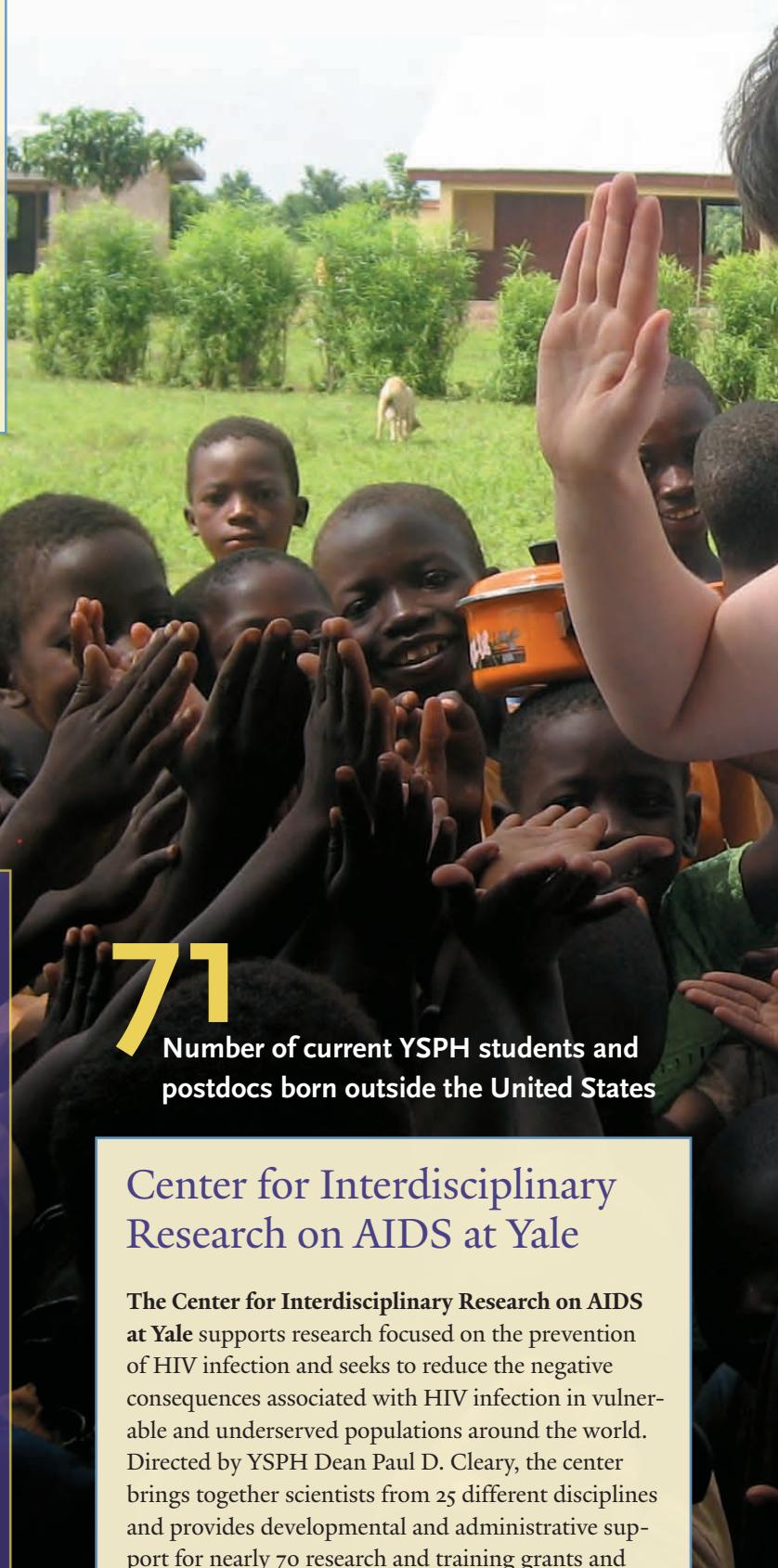
The Downs International Health Student Travel Fellowship, chaired by Kaveh Khoshnood, assistant professor at YSPH, honors the late Wilbur G. Downs, professor of epidemiology and public health. The fellowship supports public health students – as well as medical, nursing and physician associate students – who undertake health-related research in low- and middle-income countries. Since 1966, some 400 interns have fanned out around the world to research and practice public health. Fellows have contributed to an increased understanding of epidemiological, genetic, molecular biological, clinical and sociologic patterns in health and medicine. Surveys have shown that almost all Downs Fellows are profoundly influenced by this experience abroad.



Yale Institute for Biospheric Studies Center for Eco-Epidemiology

Yale Institute for Biospheric Studies Center for Eco-Epidemiology serves as an umbrella group for research and training efforts in the environmental sciences and biospheric issues. Directed by Durland Fish, professor at YSPH, the institute also sponsors international seminars and conferences; its Forum Series integrates ecology and epidemiology to address current issues in environment and human health.

While waiting for schoolchildren participating in a study on nutritional status and hookworm infection in Ghana's Kintampo North District, Debbie Humphries, a clinical instructor at YSPH, offers high-fives to the gathering crowd.



71

Number of current YSPH students and postdocs born outside the United States

“As a premier university, we have the responsibility and the privilege to both cultivate and guide our students’ tremendous enthusiasm for addressing the global health challenges of our times. We must teach them the best science but also instill in them a deep sense of integrity, humility and respect for the populations they wish to serve.”

– Kaveh Khoshnood, YSPH assistant professor, chair of the Downs Fellowship

Center for Interdisciplinary Research on AIDS at Yale

The **Center for Interdisciplinary Research on AIDS at Yale** supports research focused on the prevention of HIV infection and seeks to reduce the negative consequences associated with HIV infection in vulnerable and underserved populations around the world. Directed by YSPH Dean Paul D. Cleary, the center brings together scientists from 25 different disciplines and provides developmental and administrative support for nearly 70 research and training grants and over 50 affiliated scientists.



“To achieve sustained improvements in health, it is essential to develop the leadership and management capacity of those who can leverage resources and knowledge to improve health care in their countries. And GHLI’s focus on engaging with people in leadership roles in global health is imperative to strengthening health care systems around the world.”

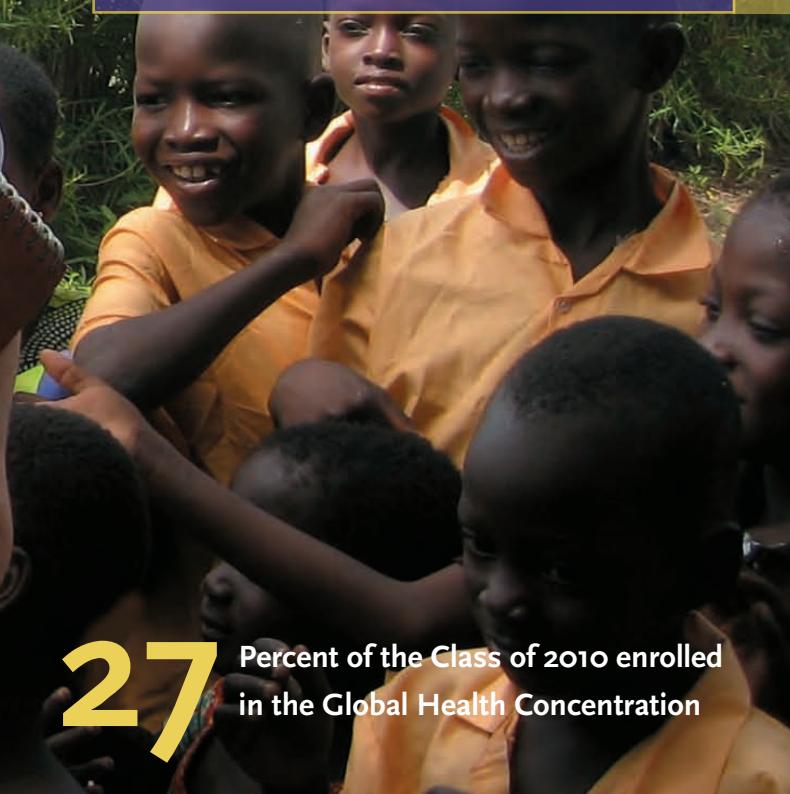
— Elizabeth Bradley, YSPH professor, director of the GHLI and GHI at Yale

Yale HealthCORE

Yale HealthCORE is a student-run organization dedicated to sustainable public health outreach in Latin America. For the past five years, students from the schools of public health, nursing and medicine have spent their spring break at Isla de Mendez, a coastal village in El Salvador. Students have worked with children on health issues such as dental hygiene, nutrition, smoking and gang peer pressure; donated medical and dental supplies to the village clinic; run a series of focus groups on sexual health and practice; and begun a water treatment program.

“Global health is inevitably *our* health.”

— Paul Cleary, YSPH Dean



27 Percent of the Class of 2010 enrolled in the Global Health Concentration

Beyond YSPH

Beyond YSPH, over two dozen other global programs throughout Yale provide international opportunities for students in the areas of health services, health training, international relations, human rights, legal studies, environmental policy and the performing arts.



Elizabeth Bradley

A global view

An architect of Yale's global health infrastructure is encouraged by widespread student enthusiasm but sees a range of difficult issues ahead.

Elizabeth H. "Betsy" Bradley has emerged as a key figure in global health at Yale. A professor in the division of Health Policy and Administration at the School of Public Health, Bradley, Ph.D. '96, is also the faculty director of Yale's Global Health Leadership Institute, which, among other things, convenes an international conference of health care professionals each year to work on specific health care problems. She also directs the Global Health Initiative (GHI) at Yale, which serves as an umbrella for faculty and students from across the university. The GHI has fostered the development of more than a dozen new courses in global health as well as a Global Health Certificate program for students in the graduate school and a Global Health Fellows Program for undergraduates.

Broadly speaking, how would you describe the state of global health today?

EB: I would say that the health of the human population globally is characterized by disparity above all. In some countries in Africa, the rate of maternal mortality is as high as 960 people per 100,000, whereas in many high-income areas it is only 6 people per 100,000. In the last decade, the commitment of funding from the United States and other high-income countries for improving health in low-income settings internationally has increased markedly, but most countries still spend less than half a percent of their gross national product on contributions to global health, so the structural inequality persists.

What are some of the encouraging trends that you see?

EB: The most encouraging trend is the exceptional interest on the part of students and the younger generations and their commitment to addressing health inequities around the globe. That kind of energy can make a real difference in the longer term, and it is palpable here at Yale and on many

U.S. campuses. Also encouraging is the growing awareness that we need to be committed to both vertical programs (those that focus on specific diseases) and horizontal programs (those that focus on health systems overall), rather than viewing these as mutually exclusive options. Integrating disease-based and systems-based interventions is critical for sustaining health improvements, and that is becoming more and more accepted.

What trends are discouraging?

EB: The continued fragmentation of global health efforts is discouraging. The coordination of the many donor and implementing partners is very difficult, and low- and middle-income countries struggle to really use all the resources available to them efficiently and effectively.

What is driving the interest in global health here at Yale?

EB: The excitement of undergraduates, as well as that of graduate students in public health, medicine and nursing, has really led the global health efforts here at Yale. But the movement is not just at Yale. We are experiencing a generational shift in which global communication, travel and collaboration are so much easier. The appreciation for worldwide issues is much more pronounced than it has been in the past. And health plays a role in that. Additionally, the existence of funding for summer internships and fellowships provided by Yale has made an enormous difference in getting students into the field. Once they have those experiences, their interest and capacity to be effective in global health grow.

What drew you to this field?

EB: A sabbatical. And one of my students, Kaakpema Yelpaala (M.P.H. '06), who was from Ghana, happened to be working with the William J. Clinton Foundation when they decided to help the Minister of Health in Ethiopia, who was strongly committed to improving his country's hospitals. The Clinton Foundation was asking its staff about people who knew about hospital administration, who might partner with them, and my work was mentioned. So, the Clinton Foundation came to Yale to talk with me. When they asked me to help in Ethiopia, I decided I would do it only if I could find outstanding alumni in hospital

"I would say that the health of the human population globally is characterized by disparity above all."

—Elizabeth Bradley

management to do it with me. I turned to Martha Dale (M.P.H. '80), and she agreed, which inspired me further. In a month, we were off to Ethiopia on a needs assessment. Once I saw the state of things and understood the ways in which my previous experience in hospital management could make a difference, I never looked back.

When you were a graduate student at Yale in the mid-1990s, is this the type of work that you envisioned?

EB: Not really. I had small kids, and I did not think I would ever travel this much. Public health, hospital management and health policy research were always what I expected to do – and teaching, of course, but I had no idea I would be engaged internationally as much as I am. You never know.

You work directly with resource-poor countries to tackle nagging health problems. Many of these countries have made impressive strides in health care. How have they been able to do this?

EB: It is hard to generalize, but there is a combination of a government committing to spend more money on health care while also building the leadership capacity within the health sector. Decentralizing budget and governance authority has been helpful for many in creating accountability in their health system. Often, there is a set of people who are strong in their leadership – that is, in their ability to engage with others locally and internationally, their commitment to improving their country's health care and their own productivity – who illustrate what can be accomplished. Of course, there are many actions and tasks that lead to improved health systems and health outcomes, but fundamentally they begin and end with country and community leadership that systematically re-engineers their financing, delivery and regulatory systems.

Can this approach be used in other settings?

EB: My experience is that the approach has to be tailored to the setting. A country's development status, its epidemiologic profile, its mix of public and private sectors in health, the percentage of gross national product being spent on health and the relative stability of its political environments matter a lot and can limit or enable various approaches to improving health. The context matters.

What is essential to making this approach work?

EB: Clarity in the country about what the goals are, ability to focus on achievable objectives, willingness to partner with complementary partners and focused efforts in the area of management. A good idea alone is just a good idea. Without attention to management, there is no way to translate good ideas from policymakers to the communities, facilities and people that can benefit. Additionally, a strong legal system and political stability are essential to this kind of health system strengthening. The main thing is to realize that it is a long process, with many setbacks, and after Plan A is tried, Plans B, C and D will ultimately be needed to make the desired changes.

Where do you see the global health movement going in the coming decade?

EB: I tend toward optimism, so I think it will continue to grow and will integrate with other key global movements to address issues that are intricately related to health. These issues might include education, economic development, human rights and international security. My view is that health, like the economy, presents fundamental decision points for how society will be organized, obligated and led. Decisions that heads of state make in the area of health are not just scientific issues; they are strategic issues, and therefore, I anticipate that, over time, some of the key leaders in low- and middle-income countries, and maybe even in high-income countries, will have backgrounds in and an understanding of the complex issues of public health and global health. That means that students who are now studying global health will in time have a large impact and influence on the shape of our societies.

What major obstacles do you think the global health movement will face?

EB: The obstacles are the obstacles that any movement faces when it tries to shift priorities – limited money, limited attention and limited leadership. Nevertheless, because the needs of health are so pressing and so integrated with achieving a just and peaceful society, the obstacles can be worked with. **YPH**

Michael Greenwood

Urban unease

In the megacities of Brazil and in many of the rapidly urbanizing parts of the developing world, a deadly bacterium threatens millions.

By Denise Meyer

Under the lens of a high-powered microscope, the spirochetal bacterium that causes leptospirosis comes into focus as a thin spiral, almost corkscrew-like in appearance.

Once this pathogen gets into the human bloodstream, symptoms develop quickly and include a dry cough, fever, muscle pain and vomiting. Failure to treat the patient with antibiotics can quickly lead to much more severe complications, including meningitis, organ failure, severe bleeding and, ultimately, death.

"The disease is a major problem in the developing world, particularly in the densely inhabited urban slums where sanitation is poor," says Albert I. Ko, M.D., associate professor and head of the division of Epidemiology of Microbial Diseases and an expert on infectious diseases that are emerging in urban slum populations.

A "major" threat

Traditionally associated with subsistence farmers, leptospirosis—also known as Fort Bragg fever, canefield fever and rat catcher's yellows, among other names—is a growing health problem that hampers progress, perpetuates poverty and saps human resources in countries as diverse as Brazil, Thailand and India.

"Leptospirosis [is] a major public health problem in the marginalized populations of urban slum dwellers and rural farmers," says Ko. "It is a life-threatening disease that causes death in 10 percent to 15 percent of those who are hospitalized with this acute condition and leads to death in more than 50 percent of those who develop the severe complication of pulmonary hemorrhage syndrome."

Leptospirosis is also a neglected disease that affects the poorest segments of the world's population. At present there are no effective control measures, and a limited understanding of the disease's pathogenesis and transmission has been a major barrier to developing interventions, says Ko.

Transmitted through the urine of dogs, farm animals and, more commonly, by the rats that swarm in urban areas, the bacterium eventually finds its way into pools of

water or into the open sewers that remain common in much of the world. Other animals are easily infected, and a person can contract leptospirosis through cuts and scratches in the skin or through contact with the mucous membranes of the eyes, nose or mouth.

Over a million people a year contract the disease worldwide—a figure that is rising rapidly as developing nations experience rapid urbanization. Today, 88 percent of Brazil's population lives in cities such as São Paulo, Rio de Janeiro, Salvador and Brasilia. More than 35 percent of these urban residents live in *favelas*, or urban slums, where underlying conditions of poor sanitation favor rodent-borne transmission of leptospirosis. Such diseases are likely to become an increasingly critical health problem as the urban population is expected to rise to 2 billion worldwide by 2025.

The primary obstacle to treating leptospirosis, meanwhile, is the difficulty of making a successful diagnosis.

Two blood tests are required, one at the onset of symptoms and a second one three weeks later. In Brazil's *favelas*, poor patients often cannot afford the modest bus fare to get to a clinic for one of the free tests. As a result, many die before three weeks have even passed. Regardless, existing standard tests are only 50 percent effective in diagnosing the disease in the early phases, when antibiotics are most effective in preventing life-threatening complications. Ko is turning his attention to genomics for solutions.

Fresh approaches

Ko's group at the Oswaldo Cruz Foundation (Fiocruz), the research branch in Salvador of the Brazilian Ministry of Health where he was stationed and has done most of his research since the mid-1990s, discovered an immunodominant antigen from the leptospiral pathogen that could easily be produced in large quantities as a recombinant protein.

This, in turn, led to the development of a prototype for a rapid test with an overall sensitivity of 78 percent—a major improvement over existing tests—in the first seven days of illness, a critical window during which antibiotics are most effective.

Ko and his Brazilian collaborators at Chembio Diagnostic Systems, a biotechnology firm specializing in diagnostic tests, are now wrapping up clinical evaluations of the test before seeking regulatory approval in Brazil. The test should be ready for use as early as next year.

Furthermore, Ko's group and their Brazilian collaborators recently received a \$3.5 million grant from the National Institutes of Health to identify the pathogen, environment

“Leptospirosis [is] a major public health problem in the marginalized populations of urban slum dwellers and rural farmers.”

—Albert Ko

and host-related determinants that enable transmission of leptospirosis in urban slums. As part of this project, they are sequencing the genomes of more than 100 isolates of the pathogen that have been obtained from Brazilian patients to identify specific genetic factors in the bacterium that contribute to the development of pulmonary hemorrhage syndrome, the disease’s most severe manifestation.

As importantly, Ko’s group at the Brazilian Ministry of Health is actively engaged with community leaders and residents to implement field research and identify effective public health interventions at the level of urban slum settlements. His research group in Brazil has been following a cohort of 9,000 *favela* residents from the community of Pau da Lima in Salvador since 2003 and has identified open sewers and flooding as major infrastructure deficiencies associated with transmission of leptospirosis. Their findings convinced the Brazilian government to invest \$36 million toward building closed sewerage and rainwater drainage systems in the Pau da Lima community.

Ko points out that the conditions that foster leptospirosis are inviting to many other diseases endemic to impoverished urban areas – cholera, dengue fever and bacterial meningitis, to name a few. Therefore, investment in preventive measures can have a magnified public health effect.

In-country response

Ko was a young Harvard-trained doctor when he was first invited to work with Fiocruz as a collaborating researcher. The relationship has grown over the past 15 years and is now central to his research. He brought this extensive background and research infrastructure with him when joining the Yale School of Public Health last fall.

With his Brazilian colleagues, Ko established a research and training program that addresses emerging infectious diseases in urban slums. They have also created a multidisciplinary team of epidemiologists, clinicians, microbiologists and researchers to investigate various aspects of the disease, something made possible by a Fogarty International Center Global Infectious Disease Research Training grant. Furthermore, Ko’s program seeks to give community leaders and residents a voice in addressing local health issues. Toward this end, they have established work-study and scholarship programs in order to develop a cadre of *favela* residents who perform research on the health problems in their community and work with the government to improve conditions in Salvador.



Humans contract leptospirosis by coming into contact with water that has been tainted by the urine of infected animals.

Opposite, top: Leptospires as they appear under the lens of a powerful microscope. Once it gets into the human bloodstream, the bacterium causes a number of severe health complications and, left untreated, can result in death.

Fiocruz, meanwhile, maintains ongoing, population-based surveillance for leptospirosis, bacterial meningitis and other tropical diseases. A diagnostic laboratory is now the national reference center for leptospirosis surveillance; it includes a molecular strain typing center and field sites to perform community-based longitudinal studies that are designed to identify determinants of transmission for leptospirosis and the etiologic pathogens of bacterial meningitis.

Fiocruz’s infrastructure and the Fogarty program allow for development of a Brazilian and international work force of scientists and public health professionals to study these diseases and to work with the national health ministry to develop its own expertise in coping with these diseases. Some 450 Brazilians and 120 Americans have completed the training program.

“This program aims to provide the multidisciplinary skills that young researchers, students, community leaders and residents will need so that they can effectively address their health problems, as well as the underlying conditions of social inequity that have led to the emergence of these problems,” says Ko. **YPH**



HIV unleashed

A Yale epidemiologist works with Russian sex workers and their clients to stem “a perfect storm.”

By Steve Kemper

The outbreak of HIV/AIDS that devastated much of the world in the 1980s largely bypassed the Soviet bloc. Since then, the situation has reversed. While many countries have slowed the spread of HIV in the past two decades, HIV rates in the former Soviet countries of Eastern Europe and Central Asia have exploded.

“Russia is experiencing one of the world’s fastest-growing HIV epidemics, and it doesn’t show any signs of stopping,” says Linda M. Niccolai, M.Sc., Ph.D., associate professor in the division of Epidemiology of Microbial Diseases. Niccolai recently completed a unique pilot study in St. Petersburg on how the link between drug use and street prostitution is accelerating the spread of HIV/AIDS and could further push the infection into the general population.

About 80 percent of the registered HIV cases in today’s Russia are among intravenous drug users. Of these, an important subgroup is sex workers, particularly those on the street. In St. Petersburg, for instance, nearly 100 percent of the female street prostitutes use intravenous drugs. The combination of sex work and drug use by these women substantially increases their risk for HIV/AIDS.

“The implications of this are driving our research,” says Niccolai. “Where is the epidemic going? The sex workers are highly vulnerable to HIV infection; as a result, they become potentially important for transmission. If their clients go home and have sex with their wives and girlfriends, they become a potential bridge for HIV transmission between

“Russia is experiencing one of the fastest-growing HIV epidemics in the world, and it doesn’t show any signs of stopping.”

— Linda Niccolai

a high-risk core group—the sex workers—and the general population.”

To assess this potential, Niccolai needed to talk to the sex workers’ clients—a challenging proposition. She turned to Stellit, a nongovernmental organization in Russia that has been doing outreach to St. Petersburg’s sex workers for a decade and has their trust. Through Stellit, Niccolai recruited 62 men in early 2010.

“We worked in an outreach van that goes where the women work,” she says, “into the outskirts of the city where there are big parking lots. It’s very dark and there doesn’t appear to be much going on. And then the women come out, because they know the van, and jump on board to receive condoms and medical and social support.”

The Stellit workers asked the women to bring some of their clients to the van to talk to researchers. The clients would receive a small payment (about \$17). Others responded to coupons that the sex workers handed to their clients, with the explanation that researchers wanted to pay them to answer questions. The clients would call the number on the coupon and set up an interview. “I was amazed at how willing people were to participate,” says Niccolai.

Her findings raise troubling concerns. Three-quarters of the men had sex partners who weren’t prostitutes. And more than half the men had sex with both prostitutes and nonprostitutes and used condoms inconsistently—a recipe for HIV/AIDS infection. Niccolai calls these men “active or potential bridgers” who could play a role in spreading the infection into the general population.

The pilot study demonstrated that the clients of sex workers can be recruited for further research. It also underlined the imminent danger of HIV/AIDS moving into the general population via men who visit sex workers. And the study offered glimpses of other areas that need further exploration, such as the role of alcohol in HIV transmission, the evident lack of risk perception among the men and the need for more HIV testing and education.

The work yet to be done in Russia invigorates and dismays Niccolai—invigorates because she’s greatly interested in the transmission dynamics of HIV, dismays because she doesn’t see much political will there for prevention.

“The transition from communism to the free market,” she says, “has made Russia a dynamic place, but unfortunately it has created a perfect storm for the transmission of HIV/AIDS.” **YPH**

Steve Kemper is a freelance writer in West Hartford, Conn.



Natalia Shuter

Sex workers and their clients play an increasingly important role in HIV transmission in St. Petersburg, Russia.

A malaria misstep

Misdiagnosis of a fatal disease in Tanzania has resulted in many shunning a potentially lifesaving treatment.

By Steve Kemper

Malaria kills nearly a million people every year, so the Centers for Disease Control and Prevention (CDC) was excited about the prospect of introducing a highly effective new treatment known as ACT (artemisinin-based combination therapy). The intervention in Tanzania, which has one of the world's highest rates of mosquito-borne disease, was hugely successful, at first. Health officials were optimistic as people crowded into public clinics for treatment.

But in the intervention's second and third years, something changed. Fewer and fewer people came to the clinics for malaria treatment. What happened?

That's the question Achyuta R. Adhvaryu asked himself. A health economist and assistant professor in the division of Health Policy and Administration, Adhvaryu, Ph.D. '09, had been working with the CDC in Tanzania when ACT was introduced. He knew the therapy was sound, so the reason for the waning demand had to be elsewhere.

He eventually pinpointed the culprit: misdiagnosis. Anyone who came into a clinic with a fever, the primary symptom of malaria, was given ACT. But many of these patients didn't, in fact, have malaria. One consequence of giving ACT to such patients is that it could create parasitic resistance to the new drug and eventually make it ineffective. "But I argue it does more than that," says Adhvaryu. "From a behavioral standpoint, it can slow or even shut down the take-up of this effective new drug."

This insight has critical implications for researchers working in the developing world. Promising new therapies are not enough. Their benefits may be lost if they are poorly introduced and administered.

And that is what is happening in Tanzania. Since everyone with fever was given ACT, those with malaria got relief, but those with something else — about 60 percent of cases — did not. Both groups told neighbors and friends about their experiences with the drug, thus leading to two contradictory stories about ACT spreading through social networks.

The result was confusion or, as Adhvaryu puts it, "noise." As people heard that the new therapy was ineffective, sick individuals reverted to the habit of seeking informal treatment by buying medicines at drugstores and kiosks or visiting traditional healers. Through a combina-

tion of misdiagnosis and rumor, a powerful anti-malarial treatment was being rendered ineffective.

Much of the misdiagnosis in Tanzania occurs because few health centers in remote areas have the ability to draw blood and examine it for malaria under a microscope. One potential solution, says Adhvaryu, is to provide the centers with supplies of rapid diagnostic kits for malaria, a simple finger-prick test that's easy to interpret. Then only the people who really need ACT would receive it.

The economic consequences of the misdiagnoses are severe, says Adhvaryu. A patient who comes to a clinic with pneumonia and gets the wrong medicine will stay sick and lose more productive time. Similarly, a person with malaria who avoids treatment because of rumors about ACT also loses productivity. In addition, misdiagnosis is costly to the health care system. ACT is currently ineffective for 60 percent of the people receiving it — a great waste of money and drugs. As more people become resistant to a new therapy, the cost of providing it to them becomes wasteful because it doesn't work. More significantly, there's the enormous cost of developing a new therapy.



A young woman uses bed netting to cover the window of her home in Tanzania to keep mosquitoes at bay.

"That's maybe 10 years and hundreds of millions of dollars," says Adhvaryu, "and that's development money being squandered. Meanwhile, many lives are also being lost, as well as lots of productivity. So from all angles it's an economic loss of massive proportions."

Adhvaryu traces his interest in the intersection of health care and development back to his childhood. He was born in India and spent many summers there; as a child, the vast poverty impressed itself upon him. And health, he notes, "is a core part of development. It affects every aspect of an individual's life." **YPH**

A new generation, and gender, of health professionals



Participants in the 10,000 Women program discuss approaches for a strategic management case study. Yale is working with Tsinghua University to train a generation of female health care managers in China.

An ongoing program in China trains a cadre of female health care managers to meet a country's rapidly growing needs.

By Michael Greenwood

As China continues to develop into an economic and political force for the 21st century, its public health needs follow close behind.

Indeed, modern China is experiencing sharply growing rates of cardiovascular disease, diabetes, cancer and other diseases among its population of more than 1 billion people.

The Yale School of Public Health, in partnership with China's Tsinghua University in Beijing, created a program to train the next generation of health care managers to meet what promise to be staggering health demands.

However, there is something unique about the program's graduates: all of them are women.

Tapping into a vast pool of professionally trained women, the program has already graduated well over a hundred women who, in addition to their clinical training as physicians or nurses, are now working in China's hospitals and health care centers as skilled executive managers. Hundreds more women are slated to graduate from the program in the coming years.

"The program is part of empowering women to play leadership roles in health care, including directing resources and staff, making tough allocation decisions and advocating for their organization with outside constituents," says Elizabeth H. Bradley, Ph.D. '96, professor in the division of Health Policy and Administration, faculty director of the Global Health Leadership Institute (GHLI) and principal investigator of the Yale-Tsinghua program. "Women are

critical to health care systems but have not always been in leadership positions."

At the same time, the program has spawned collaborative health services research with Tsinghua and Yale faculty. The first study includes a survey of 5,000 households to understand the impact of new health financing reforms on rural families living along the Yellow River. "Such a survey is very complex, but the information is important for examining whether new financing schemes are benefitting the poorest people in China," says Hong Wang, M.D., Ph.D., associate clinical professor at YSPH.

The Yale-Tsinghua Certificate Program in International Healthcare Management was launched in 2009 in collaboration with Goldman Sachs' 10,000 Women initiative. The program seeks to provide 10,000 underserved women worldwide with business and management education.

Yale's goal is to train approximately 500 female Chinese health care managers during its four-year involvement. In 2012, Tsinghua University will take over the training and continue to run the program.

"Our program takes the best of the best and equips these women with cutting-edge management and leadership skills so that they and their institutions can be as efficient and effective as possible," says Martha Dale, M.P.H. '80, director of the GHLI's China Programs.

Bradley says that she is not aware of another program in China that specifically builds the leadership capacity of women in health care. The program's curriculum is challenging and rigorous. Participants spend months learning skills that will enable them to improve the efficiency and effectiveness of their individual hospitals, clinics and health bureaus. This training, in turn, translates into tangible improvements for patients, such as a reduction in hospital infection rates and wait times.

So far, the training and research opportunities have attracted students from health care institutions in Beijing and 18 other provinces. There are plans to expand the training to the much more remote, rural regions of western and southwestern China, where health care needs are pressing.

The GHLI also has similar programs in Ethiopia, South Africa and Liberia to educate health care leaders and develop applied health services research. "Although much attention is directed now at improving health care delivery in low-income settings, most of the efforts focus on building clinical capacity, which is important. But without the management capacity also, it is hard to make systematic changes that are sustained over time," says Dale. [\[YPH\]](#)

Healthy beginnings



Why some women breastfeed, and why some do not, is a deceptively complex question pursued by a Yale researcher with an eye toward promoting better health for mothers and their infants.

By Theresa Sullivan Barger

Despite the American Academy of Pediatrics recommendation that new mothers breastfeed exclusively for the first six months and continue to breastfeed for at least a year, only 13 percent of American women follow the guideline.

And the breastfeeding rates are even lower among poor and minority women.

The Centers for Disease Control and Prevention (CDC) reports that three out of four mothers start their newborn's life with breastfeeding. Why do so many quit along the way?

Rafael Pérez-Escamilla, Ph.D., professor in the division of Chronic Disease Epidemiology and director of the Office of Community Health at Yale, has worked for two decades to answer this deceptively complex question.

"Breastfeeding promotion is one of the public health measures that can have the most impact on both maternal and child health in developing and developed countries," Pérez-Escamilla says. "It's what nature intended."

Pérez-Escamilla recently studied a group of women in Hartford, Conn., who were enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). He found that women who had planned their pregnancies were twice as likely to breastfeed for longer than six months as those with unplanned pregnancies. And with each added year of age, mothers were 9 percent more likely to breastfeed for more than six months. But the longer a mother had been living in the United States, even if she came from a culture that emphasizes breastfeeding, the less likely she was to breastfeed for more than six months. Women identified lack of breastfeeding counselors, WIC's distribution of free infant formula and lack of access to breast pumps when returning to work as barriers to breastfeeding.

But breast milk remains the ideal nutrition source for babies. Indeed, it provides multiple health benefits to both the child and the mother, including antibodies that protect babies from many common childhood illnesses; nutrients that foster better neurological development; reduced risk for breast and ovarian cancer for mothers; and lower obesity rates among children.

Since graduate school, Pérez-Escamilla has also conducted pioneering interventions that have been shown to increase optimal breastfeeding behaviors in regions as diverse as West Africa and Latin America and amongst Latinas in Connecticut. Regardless of geography, breastfeeding support in maternity wards and in the community was found to be crucial to mothers beginning and staying with breastfeeding.

In the not-too-distant past, it was a familiar practice in American hospitals for new mothers to be separated from their babies at birth, for breastfed babies to be given pacifiers or bottles and for mothers to be sent home with free infant formula. The Baby-Friendly Hospital Initiative (BFHI), a World Health Organization/UNICEF program with which Pérez-Escamilla is closely involved, is working to eliminate these practices worldwide.

Because of his track record on breastfeeding promotion at the local and global levels, Pérez-Escamilla and his research group were recently chosen by the CDC to advise them on how best to further increase BFHI's national reach using an evidence-based approach. Also, the Institute of Medicine has appointed Pérez-Escamilla to chair a committee charged with identifying ways to improve breastfeeding promotion among WIC clients.

"There's a lot we need to do in terms of making the breastfeeding environment much friendlier to women in public places and work environments and at social events," he says.

Pérez-Escamilla's path to a specialty in breastfeeding has something to do with barley and hops. Trained as a petroleum engineer with a degree in chemical engineering, he began work on a master's in food engineering. He studied malting and brewing because he thought it would be an enjoyable way to learn biochemistry.

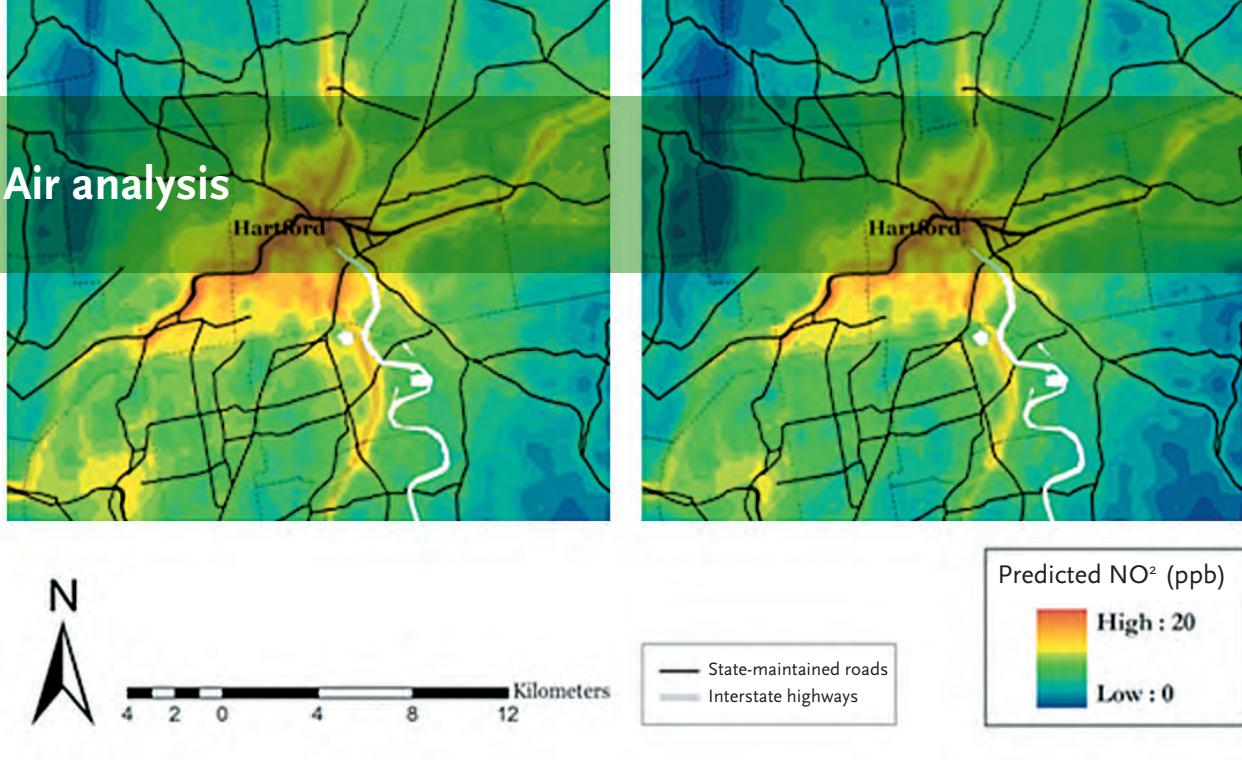
While taking food science courses, he learned that the iron in breast milk is much better absorbed than that in spinach and realized that dietary quality matters. "I really started feeling like public health was my calling," Pérez-Escamilla says. He enrolled in a doctoral program in nutrition.

"My father always instilled in me the importance of addressing the social inequities in my native Mexico," he says. "Even when I was planning to do a master's in food engineering, my plan was to develop a magic cookie that would save the hungry people in the world." **YPH**

Theresa Sullivan Barger is a freelance writer in Canton, Conn.



Air analysis



YSPH researchers devise a model that estimates traffic-related pollution accurately and economically for use in Connecticut and beyond.

By Michael Greenwood

For environmental epidemiologists seeking to curb the many health problems associated with air pollution, a vital first step is the ability to accurately assess population exposures to ambient pollutants.

And while there are a number of methods that allow scientists to do just this, each has at least one serious shortcoming that, depending on circumstances, can make its use unfeasible or prohibitively expensive.

To address this dilemma, an accurate, economical and comparatively easy-to-use method for estimating traffic-related air pollution has been developed for use in Connecticut by a team of researchers from the School of Public Health and the Yale Center for Perinatal, Pediatric and Environmental Epidemiology.

This new exposure model avoids the need for more expensive monitoring efforts. Instead, it relies on readily available public information—such as census numbers, land use data from satellites and traffic counts—as the basis for a model that predicts residential nitrogen dioxide (NO_2) levels. These statistics and other data, such as elevation and prevailing wind direction, are used in a mathematical model that provides an accurate estimate of NO_2 concentration in a particular location.

“Our approach provides a cost-effective way of measuring exposure that can be used in environmental epidemiology. In addition, it provides a way of understanding

the distribution of exposure, which can be important for developing public health policy,” says Theodore R. Holford, Ph.D. ’73, the Susan Dwight Bliss Professor of Public Health in Biostatistics and a member of the research team. “By using detailed spatial data on some of the major sources of air pollution and factors affecting their dispersion, we are able to estimate levels of environmental exposure at a site.”

Air pollution remains a serious public health challenge and is linked to a number of conditions, including childhood asthma. Current evidence suggests that even short-term NO_2 exposures can result in adverse effects, including inflammation of the airways in people who are otherwise healthy and increased respiratory symptoms in people with asthma. Also, NO_2 is a precursor to several other forms of air pollution, including ozone and nitric acid. Further, studies show a connection between short-term exposure to elevated NO_2 concentrations and increased visits to emergency departments and hospital admissions for respiratory ailments, especially asthma, according to the U.S. Environmental Protection Agency.

To calibrate their model for maximum accuracy, the researchers gathered 3,140 samples at 985 locations in Connecticut from 2006 to 2009. The environmental and population variables were determined for each of the test sites, and NO_2 samples were collected using small air samplers placed outside the back door of each home and left in place for a month. The model suggests that approximately 67 percent of the variation in NO_2 levels can be explained by traffic volume and types of land use within two

Above: Predicted NO_2 levels, indicated by color ramp from blue (low) to bright orange (high), for the Hartford, Conn., area for a winter day (February 1, 2009, left panel) and a summer day (August 1, 2009, right panel). Town borders are indicated by dotted black lines. The Connecticut River widens as it flows south of Hartford (white).

"Our approach provides a cost-effective way of measuring exposure that can be used in environmental epidemiology." – *Theodore Holford*



kilometers of a residence. Population density, the time of year and a home's elevation are other factors.

The team's modeling approach can be recalibrated relatively easily and applied to residential locations in other states and, potentially, other countries.

"In the United States and in other developed countries, these data are likely to exist. But they may currently be more difficult to obtain in developing nations," says Katherine J. Skene, M.P.H. '09, a member of the research team and now a doctoral student. In addition to Holford and Skene, the team includes Brian P. Leaderer, M.P.H. '71, Ph.D. '75, YSPH deputy dean and the Susan Dwight Bliss Professor of Epidemiology in Environmental Health, as well as Janneane F. Gent, Ph.D., and Kathleen Belanger, Ph.D. '85, both research scientists.

Yale recently received funding from the National Children's Study – a multiyear effort that will follow 100,000 children from before birth to age 21 to better understand how air pollution and many other factors shape health – and the team hopes to work with investigators in other states to calibrate the model for use in estimating local air pollution levels in their geographic locations. In addition, the team is using their traffic model approach to estimate levels of other traffic-related pollutants, such as elemental carbon.

Still, there are barriers to transferring the model to sites beyond Connecticut. Using it in neighboring Rhode Island would require relatively little effort, since conditions there are generally similar. Applying it in a state as far away and geographically different as California, for example, would likely require a lot of preparation. In order for the model to be applicable in settings beyond Connecticut, mapped road systems with associated traffic volume data, satellite land use data, elevation figures and census population density data are all required.

Additionally, as part of the calibration process and before the model can be used to predict NO₂ levels, a set of measured samples of NO₂ taken at a variety of times and locations must be obtained. This tends to be the most difficult part of the research, given the need for physical placement of pollutant monitors, followed by sample collection and lab processing.

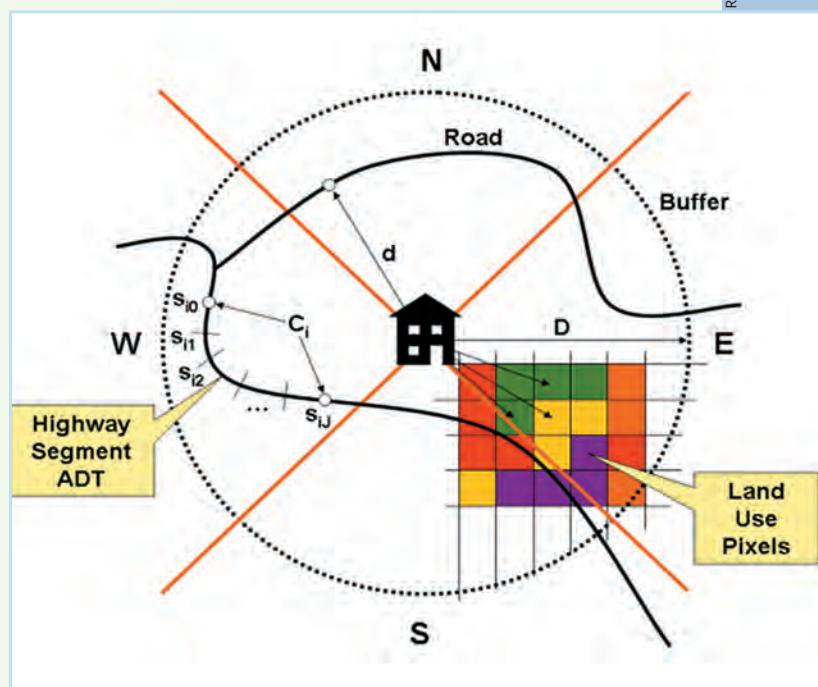
Skene explains that the modeling approach designed for Connecticut relies on average daily traffic volumes on the state's interstates and highways; considers the full network of roads near a residence, plus the landscape characteristics of the surrounding areas; and also takes the season into account. This approach strikes a balance between previous modeling options by using readily and publicly available

data sources, while retaining the ability to assess the effects upon NO₂ of traffic and landscape at a variety of distances and directions from a particular residence.

And, as with any scientific model, this one can potentially be enhanced, Skene says. One could improve the input data for the model by incorporating daily variations in traffic volume, in place of, or in combination with, the current daily traffic counts, which are averaged over a year. Similarly, finer-scale meteorological data, for example, wind speed and direction, could be used to further modify the NO₂ dispersion function according to date and location. Continuous measurement of real NO₂ levels at certain central locations may help better describe seasonal fluctuations.

"The next version will consider the geographic and temporal variability of weather-related factors. Whereas the current model includes only the main effects of traffic and landscape upon NO₂, a more sophisticated model might also consider interactions between these factors," she says. **[YPH]**

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Traffic volume and land use components of a model for estimating residential NO₂ levels are calculated within the buffer of radius D (dotted black line) surrounding a residence. Within this buffer area, the traffic volume component uses state-provided average daily traffic (ADT) counts on curve segment C_i of roadways (thick black lines) that are subdivided into 50-meter roadway segments. The distance from a residence to the roadway is denoted by d . Land use categories, shown as color-coded pixels, enter the model as area in hectares of each category within a buffer. Also shown are axes (orange lines) dividing the buffer into four directional quadrants (i.e., north, east, south and west of residence).



In-country answers

Researchers apply the principle of “positive deviance” to improve the performance of Ethiopia’s health care centers.

By Steve Kemper

What links Vietnamese mothers with health care in Ethiopia? A principle called “positive deviance.”

In the 1970s researchers first noticed that despite widespread malnutrition among children in rural Vietnam, some kids were flourishing. It turned out that the mothers of the healthy children were putting tiny shrimp and crabs from rice paddies into their dishes, despite a cultural bias against feeding shellfish to children. Once the benefits of the diet were understood and broadcast, the diet was widely adopted and malnutrition plummeted.

Researchers have taken this idea of discovering a community’s “best practices” and applied it to health care. They call the approach “positive deviance”—that is, practices that deviate in a positive direction from the norm.

“The approach assumes that wisdom about solutions is out there in the health care delivery system,” says Leslie Curry, M.P.H., Ph.D., research scientist and lecturer in the division of Health Policy and Administration, “and that we as researchers shouldn’t presume to create strategies in a void.”

That’s what a team from YSPH and the Yale Global Health Leadership Institute (GHLI), led by Elizabeth H. Bradley, Ph.D. ’96, professor in the division of Health Policy and Administration, have been doing in Ethiopia’s health care centers as part of a larger initiative funded by the William J. Clinton Foundation. The Yale team’s goal is to identify the best maternal and child health practices among Ethiopia’s health centers and then circulate them through the entire health care system.

A few health care facts about Ethiopia: There were fewer than 700 health centers serving this country, about the size of Texas and California combined, before a massive expansion effort started in 2007. Most of the population lives in rural areas, and less than half the population lives within walking distance of a place that can provide treatment.

Curry’s study looked for the exceptional performers among 20 health centers, based on three indicators: prenatal care, HIV testing and the number of births overseen

by a trained birth attendant at a health center (as opposed to traditional home births). Two centers were identified as consistently high performers—the positive deviants—three as most improved, and two as consistently low performers.

Next, teams from Yale, including students in public health and medicine, visited the sites. They observed and conducted in-depth interviews to discover how and why the health centers performed exceptionally or poorly.

“It’s amazing that these centers function at all,” says Patrick Byam, M.P.H. ’08, research associate with the GHLI and project manager of the effort. “They are getting electricity and running water, but the roads are horrendous, they don’t get supplies and they face terrible constraints. Still, I have seen some pretty impressive changes in some.”

Given equally severe circumstances, why do some centers achieve better performance? High performers solved problems innovatively. For example, one raised money for medications by starting a farm and selling produce. Low performers tended to let circumstances paralyze them and viewed their situations as impossible to change.

The high performers also had stronger relationships with the government bureaus that oversaw their work and found leadership in their communities to support health care as a community service. These health centers advocated effectively for their needs at the regional level, ran well-organized staff meetings with clear agendas and motivated staff by formally recognizing people’s contributions (in lieu of unavailable financial incentives).

Another tenet of positive deviance is that cultural norms, and the culture within an organization, can improve or damage health care delivery. In Ethiopia, the high-performing centers cultivated the community’s political and religious leaders as ambassadors to help overcome the stigma against HIV testing and the risky tradition of home births. The lower-performing centers were isolated from their communities. “You can build a great health center,” says Curry, “but if the moms won’t go there, it’s not a success.”

For Curry, applied solutions are the payoff of positive deviance. “There’s this gratifying intersection of science and practice,” she says. **[YPH]**

Steve Kemper is a freelance writer in West Hartford, Conn.

Health clinics located throughout Ethiopia’s vast countryside are being studied by Yale researchers to identify successful practices that can be transferred to other centers struggling to improve health care quality.

Patrick Byam



Arsenic and old wells

In the Romanian countryside, a Yale researcher is examining how a dangerous metal affects reproductive health.

By Steve Kemper

Most people would be surprised to learn that they regularly ingest arsenic, and further surprised that it's usually not anything to worry about. Trace amounts of the metal enter the body in food, especially fish, but the majority of this type of organic arsenic usually passes through the system without harm.

The form of arsenic that poses a serious risk to human health is the inorganic form, and sources include drinking water from polluted wells and occupational exposures.

The concentrations aren't worrisome in most cases, but in some places in the world they reach and exceed dangerous levels. This can be caused by runoff from polluting industries such as smelting, but more often it occurs naturally in ground water due to underground geology.

Epidemiologists and health officials pay attention to arsenic levels in water because the metal has been linked to cancers of the skin, lung, bladder, liver, kidney and prostate. It can also cause hypertension, diabetes, numbness, skin discoloration, gastrointestinal problems and impaired immune response.

Kathleen M. McCarty, M.P.H. '00, Sc.D., assistant professor in the division of Environmental Health Sciences, is familiar with many of these health effects from her previous work in Bangladesh, where the drinking water has some of the world's highest levels of arsenic because of its underground geology. The World Health Organization recommends that arsenic in drinking water not exceed 10 ppb. In Bangladesh the levels reach 1,200 ppb, and the consequences to human health are clear.

In her current project, McCarty is studying the connection between arsenic in the drinking water of two counties in Romania and the incidence of skin cancer. She is also involved in two pilot projects studying hypertension and birth outcomes. Romania's levels are much lower than those in Bangladesh, but they are still elevated—between 50 and 200 ppb. A decade ago when the new standard for arsenic in drinking water was set, most studies focused on the relationship between arsenic and various cancers.

"Reproductive health wasn't looked at," says McCarty, "so it's interesting to look at these lower exposures in Romania to see if they are tied to birth weight or other birth



Kathleen McCarty

Some public drinking wells in Romania contain high levels of arsenic. A researcher at the School of Public Health is examining the health consequences of long-term exposure to the chemical.

outcomes." Scientists have just started studying this area, with contradictory results: some of the studies have found reproductive health effects, and some have found none. To McCarty, the discrepancy means that more data are needed. She would particularly like to know whether long-term exposure to low levels of arsenic affects fetal and infant health, birth weight and neural tube development. If so, she says, "that may impact future drinking water standards for arsenic."

McCarty is collaborating with the Environmental Health Center, a Romanian nongovernmental organization, which has been doing research for more than 20 years, including work on arsenic in ground water. In another collaborative project in Huelva, Spain, McCarty and scientists at the University of Huelva are studying how the area's use of ground water, which is contaminated by arsenic due to mining and other industries, correlates with the incidence of bladder and lung cancer.

Several factors complicate the study of arsenic's effects on health. Most obviously, people drink different amounts of water, which raises issues about dosage and the duration of exposure. Second, there is human behavior. In Romania, the government remediated the problem of arsenic in ground water by installing tap water systems with filters, but many people continue to get their water from the village well—the source of the problem. "It's cultural," says McCarty. "Their parents and grandparents drank from these wells, and they prefer the taste."

Third, the human body wants to metabolize arsenic, through a process called methylation. But some people are genetically less efficient at this process, and hence at greater risk. And fourth, methylation can be influenced by other factors, such as diet.

"Some of my work in Bangladesh showed how higher protein intake can improve methylation," says McCarty. "So genetics, diet and other co-exposures all can influence our ability to metabolize this compound. Arsenic is an interesting metal in that sense, which is one reason I've kept working on it." **YPH**

Korea's model

South Korea implemented universal health care 34 years ago; its experience holds worthwhile lessons for other countries.

By Denise Meyer

No longer the poor agrarian nation depicted in the television series “M*A*S*H,” South Korea began to rapidly industrialize in the 1960s and transformed itself into one of Asia’s economic “tigers.”

As a result, it has earned a seat at the table of G20 major economies and ranks 15th worldwide in gross domestic product (GDP). Now a “developed” nation, South Korea implemented universal health care in 1977, and until 1996 it ran the system without deficit spending.

But deficits did appear, starting in 1997 and coinciding with a severe Asian financial crisis that swept the region. The deficits revealed a number of underlying problems with the South Korean health care system.

Indeed, there were serious problems with “regulating the supply of costlier medical specialists relative to the supply of generalists, controlling excessive use of expensive

“South Korea demonstrates that universal health coverage can be achieved alongside economic development, and within a relatively brief time,” Ruger says. “Not only does the record provide lessons for emerging nations developing public health systems, it also holds lessons for countries like the United States that are just embarking on closing the coverage gaps for its citizens.”

While South Korea has achieved important successes in meeting the health care needs of a modern nation with more than 48 million people, there have been a few missteps. For example, when the government attempted to enact sweeping reforms of the pharmaceutical industry, it inadvertently set off a series of events that resulted in an increase in the cost of health care from 4.8 percent to 6 percent of the GDP, a sharp and potentially ruinous uptick. Separating the providers of pharmaceuticals from medicine was intended to address both the abuse and misuse of prescription drugs. But both physicians and hospitals supplanted that lost income by raising fees and offering more-expensive services. After the reform, it was also common for prescriptions to be written for more-expensive drugs.

As a health care role model, South Korea’s overall success underscores “the importance of an egalitarian ethos and government attention to health and social spending,” says Ruger. Still, health disparities persist in South Korean society. In recent studies, Ruger found patterns that are consistent with those of the Whitehall studies in the United Kingdom. People in lower socioeconomic positions had poorer health outcomes; in South Korea this is especially pronounced among women.

Although South Korea is among the world’s top economies, it ranked 108th among 130 countries in the Global Gender Gap report in 2008, ahead of only a score of countries in the Middle East and Africa.

“Efforts to reduce health disparities in South Korea require attention to the root causes of socioeconomic inequality and ... gender differences,” says Ruger.

Despite this, the South Korean health care model “exemplifies one route to universal national health insurance through government-mandated coverage expansions,” says Ruger. “In the broader context of health system policy, emerging countries’ public health and health care systems offer both positive and negative lessons about health development. Such lessons can stand as role models or warnings for health policymaking, especially in the United States, and for low- and middle-income countries that are trying to achieve universal health care coverage.” **YPH**



Patients wait for care in a South Korean medical center.

technologies by private hospitals and facilities, limiting out-of-pocket expenditures, reforming its pharmaceutical industry ... and countering the multinational pharmaceutical companies’ promotional campaigns for expensive drugs,” to name a few, says Jennifer Prah Ruger, M.Sc., Ph.D., associate professor in the division of Health Policy and Administration.

Ruger has extensively studied the South Korean health model and believes that it is an important example that holds useful lessons for other countries that have instituted, or plan to introduce, similar health reforms.

Degrees of dengue



Urbanization and climate change are being analyzed by the Yale School of Public Health to determine how such variables affect a deadly tropical disease.

By Theresa Sullivan Barger

Dengue fever, a scourge in the developing world and beyond, already afflicts millions of people annually and claims thousands of lives.

And there are indications that rapidly increasing urbanization in many countries coupled with changing global weather patterns may be increasing transmission of the deadly mosquito-borne virus.

To better understand the repercussions of weather and migration on the spread and incidence of the disease, a Yale epidemiologist is utilizing highly detailed images of the Earth taken by high-flying satellites. This relatively new tool allows precision mapping down to the neighborhood level, even in heavily urbanized areas. Coupled with environmental data, such as temperature and rainfall, and data on vector production and human health statistics, the ways in which pathogen-bearing vectors, in this case mosquitoes, are responding to subtle environmental variables and the ever-changing spatial distribution of humans can be revealed.

"There are so many interacting factors. It's hard to tease them out," says Maria A. Diuk-Wasser, Ph.D., assistant professor in the division of Epidemiology of Microbial Diseases.

With funding from the Yale Climate and Energy Institute, Diuk-Wasser and colleagues have recently established a collaboration with the Colombian Institute of Health to study the effect of climate change on dengue fever transmission. Harish Padmanabha, M.Sc., Ph.D., a postdoctoral Fellow in Diuk-Wasser's group, heads the project in Colombia and is working with Yale faculty to analyze the data and collect further information.

The study is focused on three sites in Colombia, a country where dengue fever is endemic. Each site is at a different altitude, thus providing data from very different climates. One site is at sea level on the coast (Barranquilla), the second is located in the interior foothills (Bucaramanga) and the third is situated in a higher elevation (Armenia).

If researchers can better understand how and why patterns of dengue fever infection change – as well as patterns of a host of other diseases – health workers on the ground

can be forewarned when conditions are ripe for an outbreak and thus be better prepared to contain it.

Such knowledge could have significant public health implications. The World Health Organization estimates that there are 50 to 100 million dengue fever infections annually. The disease is caused by one of four strains of the dengue virus, and sequential infections result in a greater risk of developing dengue shock syndrome and dengue hemorrhagic fever (DHF). Worldwide, there are an estimated 500,000 DHF cases annually and 22,000 deaths, with children suffering the most. About 40 percent of the world's population lives in areas at risk for dengue fever, and the disease is common in at least 100 countries.

Each of the study sites is located at a different altitude, providing data from very different climates.

Since mosquitoes lay their eggs in standing water, the practice of saving water in uncovered containers – or having open containers lying around – plays a crucial role in the prevalence and spread of dengue fever.

When there is more rainfall, outdoor buckets and flower pots fill with water and become breeding grounds for mosquitoes. When there is less rainfall, people are more likely to store water for future use. Even in areas where people have running water, water insecurity causes water collection and storage, Diuk-Wasser says.

Meanwhile, if the average temperature increases, the mosquitoes and the dengue virus develop faster and mosquitoes bite more frequently.

And as populations grow – through births or immigration – in already densely inhabited areas, there are both more potential targets for infection and more potential breeding grounds for mosquitoes.

Diuk-Wasser came to epidemiology out of a love of nature and an interest in conservation. Growing up in Buenos Aires, Argentina, she was fascinated by animal behavior and wanted to be a veterinarian. She went to the University of California, Los Angeles, to earn a doctorate in animal behavior but ended up pursuing malaria research. She has extensively studied Lyme disease and West Nile virus while at Yale and is just starting to look at dengue fever more closely. "This is a new direction for my research," she says. **YPH**

Theresa Sullivan Barger is a freelance writer in Canton, Conn.



Public health students create a soccer team for refugee children and become much more than just coaches.

By Jonathan Smith

I hadn't thought this far in advance. And now, staring into the faces of a dozen, soccer-loving preteens, I had to think fast and be creative if I was going to be their coach.

It wasn't that I didn't know how to play soccer or what drill to run. The problem that I had overlooked was that none of my new players spoke any English, and the few words of their native languages—Arabic, Swahili and French, among others—that I had cobbled together weren't going to be nearly enough.



Jonathan Smith (in red shirt), a second-year M.P.H. student at Yale, encourages his young players during a game in New Haven that his team eventually went on to win.

I had arrived on the soccer field toward the end of last summer after contacting New Haven's Integrated Refugee and Immigrant Services (IRIS) to see if there were any children who might want to form a local soccer team. As I sat in the organization's office during the first week of the semester, I joked that even if the New Haven Youth Soccer league started the following week, I would get these kids into the program. IRIS called my bluff. The soccer league's first game was indeed the following weekend.

Opening day scramble

A whirlwind of organizing, recruiting volunteers and pulling together enough soccer equipment to outfit my new team followed. And then, at our first official practice, I realized that I had no way to communicate with any of my eager players.

Actually, there was no common language at all. The team members are refugees from various countries in Africa and the Middle East: places like Iraq, Afghanistan, Somalia and the Democratic Republic of the Congo. Each of them was abruptly uprooted from their native land as a result of civil war or political unrest and moved to the United States, a culture that for them is, to say the least, unfamiliar. Their childhoods had been riddled with distrust, violence and separation. Their families were split up, and in some cases their loved ones had been killed. They had suffered losses and trauma that were almost inconceivable to me and probably to most Americans.

Our first practices were less than perfect, but I quickly noticed the children responding to the joy of a familiar sport that is the national pastime in their homelands. And, I was pleased to see, many of them had real soccer talent. I developed a newfound love for my coach's whistle and started using a dry erase board to communicate strategy. Our first match was only a few days away, and despite sizeable obstacles, I wasn't entirely pessimistic.

On game day I had arranged to pick up my players, but they were not at their homes when I arrived and I had no means to contact them. Frazzled, I arrived at the field 45 minutes before the match, and none of the players was there, either. Fifteen minutes before the game, still no one. Exactly six minutes before the game was to start, my team emerged from a path in the nearby woods, rolling into the open on their bikes and smiling widely. Something clearly had been lost in translation.

Using a combination of charades and mime, I was finally able to assign positions. We still didn't have an official team name. We had kicked around some ideas—the International Kings or Foreign Revolution—but never really settled on one. When the starting whistle blew we were informally known as “the rag-tag team.” But it didn't matter—the players were ecstatic. The sport was something that they could relate to and it took their minds off the traumas they had endured. Soccer was our common language, and all of them spoke it well. Indeed, we won our first match 7-0.

“Soccer was our common language, and all of them spoke it well.”

—*Jonathan Smith*

As the season progressed we settled into a rhythm: practices on Tuesdays and Thursdays and a game every Saturday. A dedicated core of other student volunteers from the School of Public Health (including Emily Dally, Milena Gianfrancesco, Britton Gibson, Christina Mergenthaler and Charles Murchison) helped me ensure that we were always there for the players. The students sacrificed class, study time, social events and even a YSPH happy hour to keep the schedule and to let the players know that the team mattered to us as much as it did to them.

Off-field mentoring

With time, our verbal and physical communication improved, and we continued to have success against our opponents. It turned out that I had some pretty amazing athletes who played with passion and determination. Off the field, our relationship with the players started to transcend soccer. They began to open up to us in a way that, as one player said, they had not even done with IRIS staff members. As they became more comfortable, they also became more emotional. They no longer hid the distress and anxiety associated with the upheavals they had experienced. They shared their vulnerabilities.

There were times when the intensity of their emotions spilled over into practice and games. There was more than one fistfight during drills, and it was a challenge at times to maintain a cohesive, focused practice. Seven games into the season, these emotions surfaced during a match. Two of my players were suspended for fighting with players on the opposing team. After the game, a teacher informed me that one of my suspended players was also starting to misbehave in class. I still remember her warning: “He goes to a rough school. If he doesn’t stop, he will be seriously hurt.”

One of our main goals in coaching the team was to provide consistency for the players, but as time wore on, I started to see that we had also become vital role models in the lives of these young people. And I started to appreciate how the team promoted health—it was vital to the players’ mental and emotional well-being.

We volunteers started to see the players as *our* kids, *our* responsibility. More and more, we began working with them and their families off the soccer field. We met with doctors, psychiatrists, schoolteachers and counselors. We

texted them, simply to make sure they were okay. We found out more about their cultures and exchanged stories that enlightened both the players and us. This type of involvement bore results: as the season progressed, the outbursts and fights diminished and a fraternity developed that in some ways resembled a family.



A young soccer player coached by Yale School of Public Health students smiles widely during a break from playing a sport he loves.

When the season ended, we emerged, almost miraculously, undefeated. The “rag-tag team” players were the champions of the soccer league, and we had a daylong celebration worthy of their achievement.

But more important than our perfect record, the players found some common ground with each other and made friendships that they will carry forth. And the student volunteers finished the season with an eagerness to continue working in these children’s lives and with a shared commitment that the team will carry on after some of us graduate this spring.

We have assembled medical kits for the children and their families and secured English-language software to help the players better adapt to their new home. Just as importantly, we are assembling the next generation of student volunteers who are eager to coach and mentor these children and others like them. And who knows, they might even pull off another undefeated season. **YPH**

Jonathan Smith is a second-year M.P.H. student at Yale.

Alumni Spotlight



Michael Marsland

On cancer's trail

An alumna isolates components in meat that may trigger deadly illness.

By David Funkhouser

Leah Ferrucci grew up in a vegetarian household, but she probably knows more about hot dogs, hamburgers and other meats than most people. And her work in public health continues to add to a growing body of evidence that regular consumption of certain meats may trigger biological processes that lead to cancer.

Ferrucci, M.P.H. '06, Ph.D. '09, recently returned to Yale from the National Cancer Institute, where she completed her dissertation research as part of a joint training program in cancer epidemiology. For her postdoctoral work, she is continuing her research on how lifestyle and dietary choices affect one's risk of developing cancer.

In a series of recently published studies, Ferrucci and colleagues have examined whether the amount of meat people eat—and how they cook it—increases cancer risk. Their research supports relationships between the consumption of red and processed meats and higher rates of colorectal and bladder cancers—and they have pinpointed some of the meat components that are likely involved.

Although a number of studies have found associations between consumption of these meats and certain cancers, the exact risk level and what, specifically, about meat might trigger these malignancies, remain unclear.

Growing evidence

Informed by ongoing scientific research, dietary authorities have recommended reducing meat portions, using only lean meats and favoring certain cooking methods. Overall meat consumption in the United States has risen in the past 50 years, though more slowly in recent years, according to the U.S. Department of Agriculture (USDA). Red meat remains the largest proportion of meat consumed.

The USDA, which is in the midst of updating its 2005 dietary guidelines, suggests that Americans choose low-fat meat products. In reference to cancer, the USDA's preliminary 2010 report says that "attention should be given to quantity and preparation, as some forms of meat (well

Ongoing research by Leah Ferrucci explores the link between red meat consumption and certain types of cancer.

done and processed) may be linked to specific cancers."

A 2007 report by the American Institute for Cancer Research and the World Cancer Research Fund went even further, recommending that people avoid processed meats altogether and that those who do eat red meat consume less than 18 ounces weekly. Red meats include beef, lamb, pork and veal. Processed meats include items such as hot dogs, bacon and cold cuts.

This report, based on a comprehensive review of the scientific literature, found a "convincing increased risk" of colorectal cancer associated with consumption of red and processed meats.

And now, Ferrucci and other researchers are starting to figure out why.

Ferrucci and colleagues delved into health and dietary information gathered from more than 300,000 people who participated in a years-long study conducted by the National Institutes of Health in conjunction with the AARP.

"We see a linear association. If you increase intake, you increase the risk."

— Leah Ferrucci

From surveys of diet and cooking methods, they determined how much of various kinds of meat the survey participants ate and what cooking methods they used. From those data, they also estimated how much people ingested of certain components related to meat preparation and processing—including nitrate and nitrite, which are used to preserve many processed meats and to enhance their color and flavor; heme iron, found in red meats; and heterocyclic amines and polycyclic aromatic hydrocarbons, both potential carcinogens that are produced by high-temperature cooking, such as pan-frying, grilling and broiling.

In a study published in *Cancer*, Ferrucci and co-authors reported that people whose diets had the highest amount of nitrite from all foods, and those who had the most nitrate plus nitrite from processed meats, were up to 29 percent more likely to develop bladder cancer than participants who consumed the least amounts of those substances.

In another study in *Cancer Research*, Ferrucci and colleagues found a higher risk of colorectal cancer associated with red and processed meats as well as with several meat-related components. “With colorectal cancer, we do see the increased risk for people who eat the most red and processed meats compared to the least,” Ferrucci says. “We also saw an increased risk with several of the mutagens, heme iron, nitrate and nitrite. Each of them has a potentially independent mechanism for carcinogenesis. And they may also be acting together.”

People in the highest consumption category for red meat were eating about the equivalent of one small hamburger a day, Ferrucci says. Those people had a 24 percent higher risk of developing colorectal cancer than people who consumed the least amount of red meat. “We see a linear association,” Ferrucci says. “If you increase intake, you increase the risk.”

The study was able to tease out the risk associated with individual components, as well. With heme iron, for instance, those who consumed the most had a 13 percent higher risk of colorectal cancer than did those in the lowest consumption category. Two of the heterocyclic amines were associated with up to a 19 percent increased risk of colorectal cancer for those with the greatest intake compared to those with the lowest intake. Nitrate from processed meats, meanwhile, was associated with a 16 percent increased risk of colorectal cancer.

The study followed up an earlier one by Ferrucci that looked at the development of colorectal adenomas in women. That 2009 paper in *The American Journal of Gastroenterology* was the first to concurrently examine the associations between those precancerous lesions and meat intake, cooking methods, meat mutagens formed during cooking, heme iron and nitrite.

A research career

Susan T. Mayne, Ph.D., professor and head of the division of Chronic Disease Epidemiology at YSPH, advised Ferrucci at Yale on her dissertation and now is working with her again on her latest project. She notes that the 2009 paper earned a national prize for Ferrucci that year—the best student paper from the American College of Epidemiology.

Ferrucci, 30, has never been very far away from Yale, or from public health. She grew up in Hamden and now lives in East Rock (she still has a predominantly plant-based diet but occasionally eats fish). Her father works in administrative services at Yale, and her mother worked in a health-related field for the state of Connecticut.

“I was always interested in health,” Ferrucci says. She considered medical school, but after a summer job at Yale working on an epidemiological study of chronic liver disease, her career course was cemented.

“My first year [at YSPH] exposed me to things that I hadn’t learned about before. I found the concepts introduced in some of the epidemiology courses really interest-

ing, the way that we could explore risk factors that weren’t potentially known,” Ferrucci says. “I took [Mayne’s] class on nutrition and chronic disease the first year that I was here, and that basically solidified my desire to keep exploring that area.”

Ferrucci now works with Mayne, Brenda Cartmel, Ph.D., a research scientist in the division of Chronic Disease Epidemiology, and Annette M. Molinaro, Ph.D., assistant professor in the division of Biostatistics, on a study of risk factors for basal cell carcinoma, a type of skin cancer, in young people. Much to her professors’ delight, she wrote her own postdoctoral fellowship grant and came into the study with funding from the National Cancer Institute.

“She quietly goes about her work and does a phenomenally good job at whatever she does,” says Mayne. “We were thrilled when she wanted to come back to Yale.” YPH

David Funkhouser is a freelance writer in Guilford, Conn.

Dietary recommendations for meat intake

The American Cancer Society recommends that people limit consumption of processed and red meats. “To accomplish this, choose lean meats and smaller portions, and use meat as a side dish rather than as the focus of a meal. Legumes are especially rich in nutrients that may protect against cancer and can be a healthier source of protein than red meats.”



The American Institute for Cancer Research and the World Cancer Research Fund find a “convincing increased risk”—their highest category of risk—of colorectal cancer associated with consumption of red and processed meats. Their report recommends that people “limit intake of red meat and avoid processed meat” and that “people who eat red meat [should] consume less than 500 g (18 oz) a week, very little if any to be processed.”

Alumni News



Darryl Crompton

Jewel Mullen

Nirav Shah

Mario Garcia

H. Dean Hosgood III

1970s

Darryl E. Crompton, J.D., M.P.H. '76, has been named vice president for governmental affairs and university counsel at Tuskegee University. As a professor, lawyer, public health expert and administrator in higher education, Darryl has focused on the federal, state and local regulation of health care delivery systems.

1990s

Jewel Mullen, M.D., M.P.H. '96, was named by Gov. Dannel Malloy to be Connecticut's new Commissioner of Public Health. She joined the administration of Massachusetts Gov. Deval Patrick three years ago and also directed the Bureau of Community Health and Prevention for the Massachusetts Department of Public Health.

Nirav R. Shah, M.D. '98, M.P.H. '98, has been appointed New York's Commissioner of Health by Gov. Andrew Cuomo. An honors graduate of Harvard College, Nirav was a Robert Wood Johnson Clinical Scholar at the University of California, Los Angeles, and a National Research Service Award Fellow at New York University.

2000s

Martin S. Andersen, M.P.H. '07, and **Blair E. Wisco**, M.S. '08, were married on May 8, 2010, at the Proximity Hotel in Greensboro, N.C. Martin is currently pursuing a doctorate at Harvard University. Blair is pursuing a doctorate at Yale University.

Karen Cheung, M.P.H. '05, and **Stephen Vindigni**, M.P.H. '04, were

married on July 31 in Atlanta. In lieu of the traditional pillow, the ring bearer carried three books of significance to Karen and Stephen. One was the *Yale School of Public Health Bulletin*, which lists many of the YSPH classes that brought Karen and Stephen together. Stephen is currently studying medicine. Karen is working toward her Ph.D. in health policy.

Mario Garcia, M.D., M.Sc., M.P.H. '02, is the new director of New Haven's Health Department. Mario also serves on the board of directors of Dignitas International, a Canadian-based medical humanitarian organization that provides AIDS treatment and counseling.

Annie Gatewood Hoen, Ph.D. '08, taught for Bard College's Citizen Science program in January. The three-week immersion program was designed to promote scientific literacy among arts and humanities majors and was featured in *The New York Times*. Annie is a postdoctoral fellow at Harvard Medical School.

H. Dean Hosgood III, M.P.H. '05, Ph.D. '08, was recognized by the National Cancer Institute with two Division of Cancer Epidemiology and Genetics (DCEG) Fellows Awards for Research Excellence. Dean also received the National Institutes of Health Outstanding Graduate Research Award, the Outstanding Paper by a Fellow Award, a Molecular Epidemiology Research Funding Award and a DCEG Fellowship Achievement Award.

Cara Kiernan, M.P.H. '08, and Joseph Fallon were married on September 4. Cara is an investment banker at Goldman Sachs in New York. Joseph works as an associate at Pensler Capital Corp. in Princeton, N.J.

Briseis Kilfoy, M.P.H. '06, Ph.D. '09, and Larry Aschebrook were married on New Year's Eve in Puerto Vallarta, Mexico. Briseis is doing research at the National Cancer Institute in Maryland and plans to relocate to Chicago. Larry is the president and founder of Gentry Financial Corp.

Megan C. Lindley, M.P.H. '04, received the Diane Caves Public Health Service Award for early-career excellence in public health service from the National Center for Immunization and Respiratory Diseases at the Centers for Disease Control and Prevention, where she is an epidemiologist.

Have an update?

Your classmates want to hear about you! Help us share your news of a new job, promotion, recognition, marriage, birth of a child, etc. Send items (and photos) to yph.alumni@yale.edu.

Correction

The Fall 2010 issue of *Yale Public Health* listed Matthew L. Carter as a 1985 graduate of Yale's M.P.H. program. While Matthew started his M.P.H. at Yale, he completed his degree elsewhere. We regret the error.

Challenge Fund achieves goal

The Yale School of Public Health creates 23 new funds with multi-million dollar campaign.

Five million dollars has been raised through the Challenge Fund for Public Health at Yale, an amount that better positions the school to meet emerging public health threats and eases the financial burden faced by students.

The Challenge Fund created 23 endowed funds: eight scholarship funds, seven summer internship funds and eight special-use funds.

The impact on the School of Public Health and its students will be meaningful and long-lasting. Students will have greater scholarship support and more summer internship funding.

Rebekah Wheeler, a joint-degree candidate in public health and nurse midwifery, began graduate study after working for several years managing women's health programs in Africa. The Jane Keniston Scholarship Fund allows her to pursue her goal of integrating clinical and public health perspectives into her work. "Following this path has meant taking on a significant financial burden, and receiving this scholarship has been a significant gift," said Wheeler.

Students who would have had to borrow for summer internships—a defining part of the YSPH experience—will now receive additional support. Geentanjoli Banerjee, a second-year M.P.H. student, interned at the Comprehensive Cancer Center in Puerto Rico with assistance from The Cynthia Barnett Cancer Prevention Research Fund. She was there during the nascent stages of a study

Challenge Fund by the numbers

Goal to match: \$2.5 million

Amount matched: \$2.5 million

Total raised: \$5 million

**23 newly endowed funds | 8 scholarship funds
8 special-use funds | 7 summer internship funds**

on the human papillomavirus, helping to craft questionnaires, randomizing study subjects and expanding her horizons in a real-world research setting. "My internship has sparked an interest in health disparities," said Banerjee.

Running concurrently with the University's Yale Tomorrow campaign, the Challenge Fund matched each dollar donated. The \$2.5 million in matching funds came from two Yale College alumni, Anne R. Lovett, Class of '77, and Stephen G. Woodsum, Class of '76.

Several ongoing research programs at YSPH, including health management training in sub-Saharan Africa and ovarian cancer prevention, now have a permanent source of support because of the Challenge Fund, which provides economic stability for faculty initiatives previously dependent on external funds. Support from The William H. Prusoff Fund for the Prevention of Global Infectious Diseases will enable the school to host a visiting professorship in the division of Epidemiology of Microbial Diseases this year and strengthen collaborations with researchers from developing countries.

"Given the dire national budget situation and the fact that research

support from both the federal government and foundations is getting harder to obtain, it is critical to have a more predictable and sustained source of support for our research and education programs. This support from the Challenge Fund will enable us to continue to develop cutting-edge research and education programs," said Dean Paul D. Cleary.

Sterling B. Brinkley Jr., Yale College Class of '74, funded a new scholarship for M.P.H. students as a tribute to his father. A Yale football player, Yale College Class of '40, Sterling "Brownie" Brinkley, M.D. '43, spent his entire career in public health, primarily as a medical administrator for the United Mine Workers Welfare and Retirement Fund. Later, the elder Brinkley focused on people with disabilities.

"I saw public health up close and personal," said Brinkley, "and I saw what a difference it could make."

Denise Meyer

To see a complete list of the new funds go to medicine.yale.edu/ysph/giving/makingadifference/index.aspx.

Too much of a good thing?

YSPH researcher contributes to a comprehensive health study of vitamin D and calcium intake.

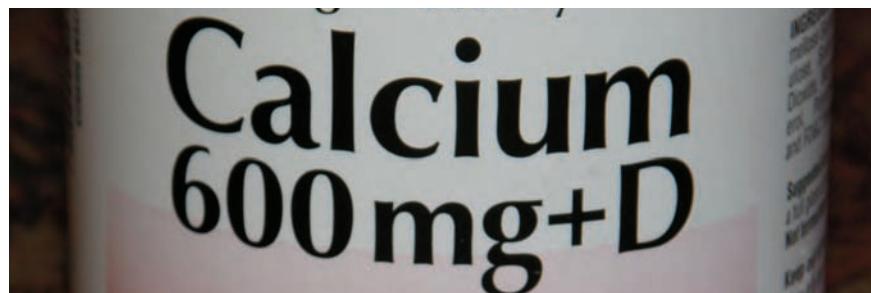
High levels of supplemental calcium and vitamin D are often unnecessary and may actually pose health risks, an Institute of Medicine (IOM) committee has concluded after reviewing 1,000 studies to determine how much is needed for optimal health.

Supplemental vitamin D has been heavily promoted in recent years not only for bone and joint health but also for immunity, high blood pressure, diabetes, cancer and autoimmune diseases. It is also routinely recommended in high doses by many doctors.

While vitamin D is recommended as a companion to calcium for bone health, the IOM committee believes that most people receive enough of these nutrients through sun exposure and a diet that includes fortified foods. The one clear exception is adolescent girls, who generally take in too little calcium.

High doses of calcium have long been promoted for the prevention of osteoporosis. The IOM study found that, when taken in excess, calcium can cause kidney stones and heart disease, while excess vitamin D has now been linked with increases in the risk of certain cancers and heart disease.

Susan T. Mayne, Ph.D., was one of 14 scientists who served on the committee. Head of YSPH's division of Chronic Disease Epidemiology and associate director for Population Sciences at the Yale Cancer Center, Mayne studies the nutritional epidemiology of chronic diseases and,



A recent study finds that excessive calcium intake can result in heart disease and kidney stones.

more specifically, the role of nutrition in cancer prevention and survivorship.

The IOM report, which explicitly denounces high-dose supplements, updates the daily dietary intake recommendations for these two nutrients for the first time since 1997. Recommended levels for vitamin D are now 600 international units (IUs) per day for ages 1 to 70 and 800 IUs per day for those older than 70.

"People have tried to compare the 1997 recommendations to the 2010 recommendations, but it is really not appropriate to do so because the 1997 recommendation was not a recommended dietary allowance, it was a so-called adequate-intake level, which has a different scientific meaning. Nonetheless, the value for vitamin D increased with this new report, which has been misused by some people to further promote high-dose supplements of vitamin D," Mayne said.

The new recommended calcium intake for adults is 1,000 mg daily, 1,300 mg per day for adolescents and 1,200 mg per day for women over age 50.

Beyond bone health, the committee found that a role for calcium and vitamin D in other chronic diseases was inconclusive, with more research needed, especially for vitamin D. According to Mayne, "some studies

suggest that higher vitamin D status is associated with a lower risk of certain cancers, especially colon cancer. But other studies suggest that the same blood levels that are associated with a lower risk of colon cancer are associated with higher risk of other cancers, such as pancreatic cancer. For some chronic diseases, the data were really limited, highlighting the need for more research."

In recent years, the number of people who have had their vitamin D blood levels tested has sky-rocketed, but laboratories do not use a standard, accepted definition for what is deficient or sufficient in their reports, with most using cut points for deficiency that greatly exceed the levels suggested to be appropriate for good health in the IOM report. This new report suggests that the number of people being told they are deficient may be dramatically overestimated. The committee noted that total intake over 4,000 IUs daily of vitamin D or over 2,000 mg per day of calcium may increase health risks and should be avoided by most people.

The comprehensive study was undertaken and funded at the request of the U.S. and Canadian governments.

Denise Meyer



Hongyu Zhao

Biostatistics professor elected Fellow of AAAS

Hongyu Zhao, Ph.D., professor in the division of Biostatistics and professor of genetics and statistics, has been elected as a Fellow of the American Association for the Advancement of Science (AAAS) Section on Statistics. The award is in recognition of Zhao's "fundamental contributions to statistical genomics and genetic epidemiology, for outstanding services to the statistics and human genetics communities, and for the training of many young scientists."

Publisher of the weekly peer-reviewed journal *Science*, AAAS is an international organization dedicated to advancing science around the world. The tradition of AAAS Fellows began in 1874.

"It is a great honor to be elected," said Zhao. "I believe this is recognition of the research I am working on, which is to develop statistical and computational methods to study biological systems and human diseases. This field has shown great promise in synthesizing large volumes of data of

different natures to better understand how our bodies work."

Zhao's research could lead to the development of personalized prevention and treatment schemes. Because the data are highly complex, statisticians play a key role in this endeavor.

D.M.

Ruger receives scholars award, named to IOM committees

Jennifer Prah Ruger, M.Sc., Ph.D., associate professor in the division of Health Policy and Administration, has received the Greenwall Faculty Scholars Award and was named to two prominent national committees—the Institute of Medicine's (IOM) Board on Global Health and the joint IOM and National Research Council (NRC) committee to carry out congressionally mandated evaluations of HIV/AIDS programs.

The Greenwall Award provides three years of support for academic faculty members to carry out original research at the intersection of ethics and the life sciences.

"It's a great honor to be selected as one of this year's Greenwall Faculty Scholars," said Ruger. "It will enable me to build on my efforts to examine and offer policy solutions to health governance issues that press all societies regardless of their level of economic development."

The IOM's Board on Global Health, meanwhile, works on international health policy as well as the health issues of developing countries and programs for prevention and control of both disease and disability. The board also manages the African Science Academy Development

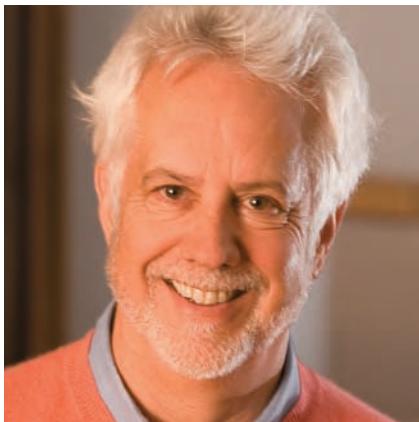


Jennifer Prah Ruger

Initiative, a 10-year effort funded by the Bill and Melinda Gates Foundation, and organizes forums on issues such as global violence prevention, the nutritional impact of the global food price crisis and prevention of the global epidemic of cardiovascular disease.

The joint IOM/NRC committee is charged with evaluating U.S.-funded programs implemented under the U.S. Global Leadership Against HIV/AIDS, Tuberculosis, and Malaria Reauthorization Act of 2008, including the PEPFAR (President's Emergency Plan for AIDS Relief) program.

D.M. and Michael Greenwood



Robert Makuch

Regulatory Affairs Certificate available at YSPH

The School of Public Health introduced a new Regulatory Affairs track in the fall.

The track is intended to complement the existing M.P.H. degree in any of the school's academic divisions and will prepare students for future roles in quality control and regulatory affairs. Its multidisciplinary approach reflects the full array of issues addressed in regulatory affairs, including legal requirements, ethics, clinical trials, epidemiology, risk analysis, leadership and change management.

"This represents a unique opportunity for students to be exposed to current issues in the regulation of food and drugs in the United States," said Robert W. Makuch, Ph.D. '77, professor in the division of Biostatistics and head of the track. "These topics – ensuring that foods are safe and that only safe and effective drugs are brought quickly to the marketplace – touch our lives every day. Hardly a day goes by without news concerning these fundamental issues that are critical to our population's health."

Among the new courses being offered is "Introduction to Regulatory Affairs," which will be taught by Yale faculty and other experts. Speakers will include Peter Barton Hutt, former chief counsel to the Food and Drug Administration and a member of the Institute of Medicine. Upon completion of the required courses, students will be presented with a Regulatory Affairs Certificate.

Michael Greenwood

Summer interns add to PARTNRS study

Local high school and college students participating in PARTNRS (Parenting and Relationship Transition and Risk Study) completed a summer internship at YSPH designed to develop public health research skills and knowledge.

The students were selected from a pool of over 80 applicants and spent eight weeks learning about various aspects of public health work, including a certification program in human subject protection, HIPAA regulations, the safe handling of blood-borne pathogens, recruiting and interview techniques, facilitating interviews and collecting specimens for testing for sexually transmitted diseases.

The internship culminated with a presentation by the students of their research findings from a study of adolescent fathers and their level of involvement with their children.

"The number of qualified applicants we received from the New Haven and Bridgeport areas demonstrates the interest in public health research and the need for this type of program, which helps to develop and grow future scientists from our own

backyard," said Trace Kershaw, Ph.D., associate professor in the division of Chronic Disease Epidemiology and principal investigator of PARTNRS. The program was funded by a grant from the American Recovery and Reinvestment Act.

Denise Meyer



Elizabeth Claus

Claus named to state expert genomics advisory panel

Elizabeth B. Claus, Ph.D. '88, M.D. '94, has been named to the Connecticut Expert Genomics Advisory Panel. The panel serves as an external advisory group that provides input and guidance to the state Department of Public Health on emerging genomic issues and activities.

"It is an exciting time to be involved in the study of genetics, but deciding how to manage all the information generated as well as consider any clinical applications will be a challenge," said Claus, professor in the division of Biostatistics at the School of Public Health and an attending neurosurgeon at Brigham and Women's Hospital in Boston.

The panel's goal is to promote the responsible and effective translation

of current and emerging genome-based information into health benefits for the population of Connecticut. Among its functions, the panel seeks to facilitate the integration of genomics into the department's program; contribute to genomic policy development; ensure that advances in genomics are implemented in a responsible way; engage and educate public health professionals, health care providers, policymakers and the public about the role of genomics in health; and ensure availability of a competent workforce to deliver genetic services.

Claus is also the principal investigator of the Meningioma Consortium Study, which seeks to identify genetic and environmental risk factors associated with the development of meningioma. Her previous work included study of the prevalence of two breast cancer susceptibility genes, BRCA1 and BRCA2, among women diagnosed with breast carcinoma *in situ* in Connecticut.

M.G.

School's doctoral program ranked among the top

The Yale School of Public Health's doctoral program was ranked among the very top in the country in a long-awaited and comprehensive survey released by the National Research Council (NRC).

Unlike the NRC's last study, released in 1995, this latest survey does not assign a specific overall ranking to each doctoral program, but rather provides a range for each. The 2010 study used two different ranking systems and each placed the Yale School of Public Health program as high as third in the nation.

The study relied on 21 criteria to assess various public health doctoral programs in the United States, including faculty publications, citation rates, grants, financial aid for students and diversity.

The results of the 2010 NRC study are based on data that were first collected in 2006. The study compared 4,838 individual research programs in 62 subject areas across 212 surveyed institutions. Nationwide, the survey involved data collected from 90,000 faculty members.

Meanwhile, Academic Analytics, which published an index of faculty scholarly productivity based on publications, citations, funded research and awards and honors, has ranked YSPH faculty as the most productive among all the schools of public health in the country. In the 2010 fiscal year, YSPH received \$36.46 million in federal grant support and \$4.24 million in nonfederal support, for a total of \$40.7 million.

M.G.

Liver cancer research under way with \$7 million grant

In what is believed to be the first population-based study of its type in the United States, a Yale School of Public Health research team will examine the genetic and environmental factors associated with liver cancer. The multiyear study is funded with a \$6.98 million grant from the National Cancer Institute.

The incidence of liver cancer in the United States has nearly doubled since 1980, and there is evidence that factors such as infection with hepatitis viruses (especially hepatitis C), obesity and alcohol consumption

are contributing to the increase, said Herbert Yu, M.D., M.Sc., Ph.D., associate professor in the division of Chronic Disease Epidemiology and the study's principal investigator.



Herbert Yu

"There are indications that lifestyle factors, such as being overweight and physical inactivity, may be especially important in contributing to the dramatic increase in liver cancer incidence. This could have broad implications in public health, because these lifestyles are increasingly prevalent in our society," he said. A genomewide analysis of nucleic acids will also be done on study participants in an effort to pinpoint the disease's genetic underpinnings.

Yu is joined on the research study by several colleagues at the School of Public Health and the School of Medicine, including Harvey A. Risch, M.D., Ph.D.; Susan T. Mayne, Ph.D.; Melinda L. Irwin, Ph.D.; Hongyu Zhao, Ph.D.; Xiaomei Ma, Ph.D.; and Joseph K. Lim, M.D. The Yale Cancer Center and the Yale Liver Center will also participate.

M.G.

Downs Fellows present international research results

Yale School of Public Health Downs Fellows joined colleagues from the School of Medicine and the School of Nursing to present the results of their international research at an annual symposium in the fall.

Roland Dimaya, an M.P.H. candidate in the division of Health Policy and Administration, studied the Philippine policy response to nurse migration. He interviewed government and private-sector administrators and held focus groups with nurses from urban and provincial settings to better understand how

the Philippines, as a leader in global labor migration, is seeking to balance its economy with its health care. The current financial crisis, along with the tightening of U.S. immigration policies, has resulted in an oversupply of nurses. The Philippine government is responding, Dimaya said, by reforming education, improving health care availability in its rural areas and looking at emerging markets in China and other places.

Another YSPH student, Benjamin T. Simms, an M.P.H. candidate in the division of Epidemiology of Microbial Diseases, investigated whether nutritional status played a role in the response to treatment among children

who are infected with hookworm in Ghana. Simms' project combined fieldwork and laboratory work. He found a high rate of treatment failure (55 percent) and a high prevalence of co-infections such as anemia (71 percent) and malaria (85 percent).

Dean Paul D. Cleary noted that the Fellowship's endowment continues to grow through donations and that the number of Downs Fellows has risen by about a third each year over the last decade. The emerging interdisciplinary nature of this work "is [Wilbur Downs'] fondest dream come true," he said.

Denise Meyer

Roland Dimaya (left) studied the Philippine policy response to nurse migration during his Downs Fellowship.



Courtesy of Roland Dimaya

Make a lasting impact on the

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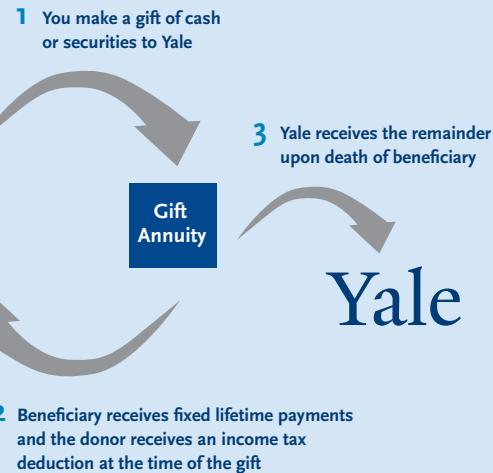
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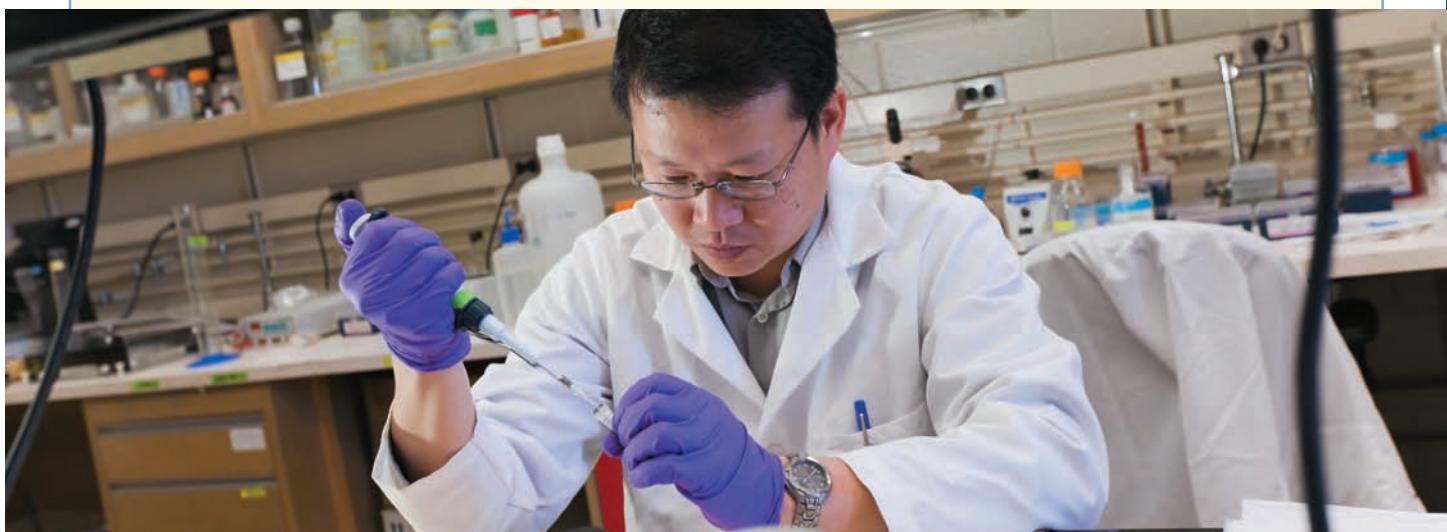
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For a personalized overview and current annuity rates, please contact Martin Klein, Office of Development, Yale School of Public Health, P.O. Box 7611, New Haven, CT 06519-0611 • 203-436-8538 • m.klein@yale.edu



Yong Zhu prepares a methylation assay as part of his research on circadian genes and cancer risk.

In Memoriam



Tyler B. Brown, M.P.H. '71, died at his home on July 17 after a long struggle with Parkinson's disease at the age of 66. After graduating from Yale University with a bachelor's degree in 1966, Tyler served in the Peace Corps for more than two years in West Africa, where he developed an interest in public health. Upon his return, he received his M.P.H. from Yale and was involved in the creation of health maintenance organizations in Connecticut. He spent two years in Curacao, in the Caribbean, working with the local health department before moving to Bow Lake, Strafford, N.H., to settle into his family home. He was the director of the Home Care Association of New Hampshire for 11 years. Tyler is survived by Christina, his wife of 41 years; his sons, Justin and Gregory, and their wives; a sister; two brothers; and four grandchildren.

Virginia M. Good, R.N., M.P.H. '52, died peacefully after a brief illness on July 18 in Atlanta at the age of 97. Born in New York City and raised by her mother, Virginia received an R.N. from the Mount Sinai Hospital School of Nursing and worked there for several years before becoming a public health nurse in New England. In 1942, she became a nurse in the U.S. Army and served for three years in the southwest Pacific. She then earned her B.S. at Simmons College in Boston and her M.P.H. from Yale. Continuing in public health nursing, Virginia later moved to Philadelphia, where she met her husband, Newell E. Good, an entomologist. Virginia was preceded in death by her husband. Survivors

include an adopted daughter, Pat Smith, and two nephews, Dave and John Pinkerton.

Lorraine V. Klerman, M.P.H., Dr.P.H., a former faculty member in the division of Health Policy and Administration at Yale, died on August 26 due to complications of cancer at the age of 81. In 1965, Lorraine contributed to a study on one of the first comprehensive service programs for school-age mothers, the Young Mothers Program. This landmark study resulted in many journal articles and a book, *School-Age Mothers: Problems, Programs, and Policy*. After earning her M.P.H. and doctorate at the Harvard School of Public Health, she returned to Yale in 1984 to begin teaching and completed a highly influential monograph, *Alive and Well? A Research and Policy Review of Health Programs for Poor Young Children*, for the National Center for Children in Poverty. Lorraine is survived by four children, Jacob, Elizabeth, Daniel and Karen; and eight grandchildren.

Charles N. Poskanzer, M.P.H. '50, Ph.D., died on October 13 in Cortland, N.Y., at the age of 84. A faculty member for 40 years at the State University of New York Cortland, Charles also served as the city's mayor and as an alderman. He joined the SUNY Cortland Health Department in 1950 and served as chair from 1967 to 1976. He earned a bachelor's degree and a Ph.D. from the University of Michigan and a master's in educational administration from SUNY Albany, in addition to his Yale degree. During World War II, Charles served in the

U.S. Navy in the Pacific. With Wilbur Cohen, the future secretary of the U.S. Department of Health, Education, and Welfare, he co-authored a 1960 study that was cited in the establishment of the Medicare and Medicaid programs. Charles is survived by his wife, Joan; four children, Sherry Wainger, Steven Poskanzer, Debby Poskanzer and Barbara Poskanzer, and their spouses; and four grandchildren.

Elaine Ron, M.P.H. '74, Ph.D., a senior investigator at the National Cancer Institute, died of cancer on November 20 at her home in Bethesda, Md., at the age of 67. Elaine was renowned as a leading expert in radiation epidemiology and the causes of thyroid cancer, as well as being a champion of women in science. She authored more than 200 peer-reviewed papers and mentored researchers from around the world. In her earliest work in Israel she identified the long-term cancer effects of radiation treatment for tinea capitis (a fungal infection of the scalp). She joined NCI in 1986 and served as chief of the Radiation Epidemiology Branch from 1997 to 2002. Her scientific achievements include the largest study of cancer risks among patients treated with radioactive iodine for hyperthyroidism and the first international effort to pool epidemiologic data on thyroid cancer. She is survived by her son, Ariel Ron.

Send obituary notices to
ysph.alumni@yale.edu.



Adrian Ostfeld (1926–2011)



Adrian M. Ostfeld, M.D., a former chair of the Department of Epidemiology and Public Health at Yale and the Anna M.R. Lauder Professor of Public Health for many years, died on January 28 at the Whitney Center in

Hamden, Conn., at the age of 84.

Adrian was born in St. Louis, Mo., in 1926 and received his bachelor's (1947) and medical (1951) degrees from Washington University in St. Louis.

Before joining the Yale faculty, Adrian was a professor and department head at the University of Illinois College of Medicine and an instructor in medicine at Cornell University. He also served two years in the U.S. Navy, from 1944 to 1946.

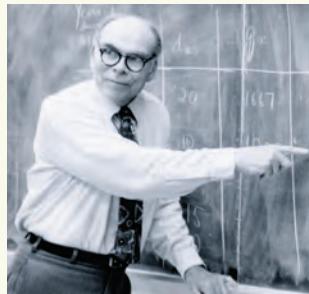
Adrian was a prominent researcher, known for his work on the epidemiology of coronary heart disease, stroke and aging, and he served as the head of the Yale Health and Aging Project. He researched and wrote widely on age-related issues, including a multiyear study of the elderly in New Haven to determine what factors caused some people to live longer than their peers. He was elected to the Institute of Medicine in 1987.

His research and teaching career at Yale spanned 25 years. During this time he served as chair of the department from 1968 to 1969 and as the Anna M.R. Lauder Professor of Public Health from 1968 to 1993.

After retiring from Yale, Adrian spent time writing poetry, archiving his extensive collection of Native American artifacts and teaching adult education classes.

Adrian is survived by his wife of 60 years, Ruth Vogel Ostfeld; three children, Cantor Barbara Ostfeld, Dr. Richard Ostfeld and Robin Ostfeld, and their spouses; and six grandchildren.

Colin White (1913–2011)



Colin White, M.D., a former chair of the Department of Epidemiology and Public Health and a longtime professor in the department, died on February 1 at the age of 97.

Born in Queensland, Australia, in 1913, Colin

was a medical officer for the Commonwealth Department of Health in Canberra and became a lecturer in physiology at the University of Birmingham in England.

With his wife, Jean, he immigrated to the United States in 1948. Colin joined Yale as an assistant professor in 1953 and was promoted to associate professor in 1957 and then to professor of public health in 1962. He served as chair of the department from 1981 to 1982. He continued his research as a professor emeritus and senior research scientist from 1984 to 2007.

Colin's research focused on the development and application of biostatistical methods in epidemiology. This included contributions to the understanding of the validity of the case-control approach to study design. Extensions of his ideas on this basic design approach also involved work to illuminate approaches for control of potential confounders of estimated associations between exposure and disease risk using matching. His biostatistical contributions played a significant role in addressing important scientific questions in epidemiological research. He was well-known for his research on inheritance in dizygotic twins.

As a beloved teacher and mentor, Colin played a key role in launching the successful careers of numerous students and junior faculty. He also instilled the importance of critical thinking and high ethical standards.

In addition to his wife, Colin is survived by a son, Allan G. White, of Hamden, Conn.

*Donations may be made to the **Adrian Ostfeld Scholarship Fund** and/or the **Colin White Scholarship Fund**, c/o Martin Klein, Yale School of Public Health, P.O. Box 7611, New Haven, CT 06519-0611. If donations meet the \$50,000 threshold required to establish an endowment, the funds will become a permanent source of support for generations of YSPH students.*

Yesterday



A research pioneer who opened doors for women in science

When Dorothy Horstmann (1911–2001) arrived at Yale in the 1940s, polio was still a major health threat, crippling and killing many, and women in science were all but unknown. She went on to shatter gender barriers and make important scientific contributions to the fight against polio and other diseases during a long and productive career.

During one polio outbreak, Horstmann discovered that only one patient showed evidence of the virus in a blood sample. This observation led her to wonder if the virus was only detectable in the blood for a short period of time before symptoms appeared. Her team ran experiments, testing the blood and stools of lab animals to evaluate how the virus progressed. They found that the virus could be detected in the blood a few days after exposure, but it disappeared by the time symptoms were apparent. Horstmann's discovery contributed to the eventual development of an oral vaccine. Her expertise on the virus also took her to the former Soviet Union, under the aegis of the World Health Organization, to monitor the new treatment's safety and effectiveness.

Horstmann went on to become a pediatrician, and in 1961 she was the first woman appointed to an endowed chair at Yale, the John Rodman Paul professorship. By the end of her career, Horstmann had received four honorary doctorates and innumerable awards and was a member of the National Academy of Sciences and the Royal Society of Medicine.

Nancy H. Ruddle, Ph.D. '68, the John Rodman Paul professor emerita and a senior research scientist at YSPH, recalls Horstmann as "a force of nature."

Denise Meyer

Today



Looking to end the threat of African sleeping sickness

The symptoms of African sleeping sickness are as severe as they are obvious.

After the parasite invades the central nervous system, victims experience confusion, decreased coordination and, as the name implies, severe disruptions to their normal sleep patterns. Untreated, victims can lapse into a coma and die.

Endemic to sub-Saharan Africa, sleeping sickness, or Human African trypanosomiasis, continues to kill tens of thousands of people each year and devastate the livestock upon which they depend. The African trypanosome parasite is transmitted by the tsetse fly, a biting insect that lives on vertebrate blood.

Thousands of miles away in the sixth-floor lab of Serap Aksoy (pictured above), an insectary with thousands of tsetse flies is used in studying the disease and in developing novel strategies to curb or eliminate it.

"Diseases caused by trypanosomes have devastated human and animal health," said Aksoy, Ph.D., professor in the division of Epidemiology of Microbial Diseases. "The most effective way to curb diseases involves control of the tsetse fly populations."

Toward this end, Aksoy's lab is looking at ways to genetically alter the tsetse fly so that it is resistant to the trypanosome parasite. The key might be a naturally occurring bacterium in the tsetse fly known as *Sodalis*. If the researchers can alter *Sodalis* so that it contains anti-trypanosome genes, the genetically modified bacterium could then be injected into female tsetse flies, whose offspring would be resistant to the parasite that causes the disease.

Tsetse flies would still be active, but the disease would be effectively neutralized.

Michael Greenwood

Yale Public Health
60 College Street
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