



AS THEY TACKLE DAUNTING DISEASES,
THREE STUDENTS LEARN ABOUT MORE
THAN MEDICINE | BY REID R. FRAZIER

BREAKING GROUND

About once a week over the past year, Kate Dickman hopped in a 4 x 4 with a team of nurses and social workers, colleagues on a tuberculosis research project. They would bump along Kampala's rutted, muddy streets *en route* to the Komamboga Health Center. If Dickman ever wanted a reminder of why she was in Uganda, she had only to look out the window. They'd roll past billboards advertising free HIV testing and condoms. Dickman would see young mothers begging, men sleeping in piles of garbage.

Although Uganda is one of the more stable countries in sub-Saharan Africa, AIDS has exacted a toll on the economy, adding to the poverty visible out the window of the 4 x 4.

The vehicle often stopped in Kawempe, a dense neighborhood of brick, mud, and stucco homes slumping into one another under corrugated tin roofs.

PHOTOGRAPHY | COURTESY K. DICKMAN, K. PFAENDLER, AND S. WONG

For three med students, a year abroad revealed the ties among history, culture, economics, and disease. Susan Wong worked in the former capital of China, Nanjing (left). In Uganda (below and center), Kate Dickman confronted the ravages of HIV and tuberculosis. In Zambia, Krista Pfaendler assisted in surgery (below, right).



“It’s extremely crowded,” Dickman says. “There are people everywhere, motorcycles everywhere, cars everywhere.”

The area also has one of the highest rates of TB in the city. The neighborhood’s cramped houses, often shared by several families, are fertile breeding grounds for disease. TB is transmitted by a rod-shaped bacterium called *Mycobacterium tuberculosis*, usually passed through the air when a carrier sneezes or coughs. While Dickman waited with the driver, the Komamboga clinic “home visitors” would give TB tests in the neighborhood. Sometimes they’d take people with them to the clinic.

By the time they got to Komamboga, she says, another 100 people—mothers with infants, the elderly—would be waiting in line.

As one of three University of Pittsburgh med students accepted into the Fogarty International Clinical Research Scholar Program, Dickman (Class of ’09) had taken a year off from Pitt to join clinicians and clinical researchers striving to stamp out TB in Uganda.

Those who know her describe Dickman as soft-spoken and humble. In her spare time, she trains for marathons.

“She loves studying, and she loves to run,” says her father, Jim Dickman. She is also driven to make a difference. “She chose to study one of the top three killers—that was not a fluke,” says Catherine McEllistrem, a molecular epidemiologist and Pitt assistant professor of medicine on staff at the VA Pittsburgh Health Care System who mentored Dickman.

“From the get-go she has focused on ‘How can I help reduce some of these globally devastating diseases?’”

Dickman grew up in Fort Jennings, Ohio, a no-stoplight hamlet in the state’s northwest corner. Her parents still talk of how she filled their basement with Petri dishes for a junior high science fair project. After her first year at Pitt, she worked in western Kenya on a malaria research project run by Pitt’s Douglas Perkins, assistant professor of infectious diseases and microbiology in the Graduate School of Public Health. There she saw children die from treatable diseases. Before she even got home, she e-mailed her Pitt med classmates about starting a charity for HIV-infected children. (The students’ Kenyan Pediatric HIV Project has raised more than \$20,000 to date.)

Yet no other experience has stretched Dickman like her year in Uganda. Working with researchers at the Uganda–Case Western Reserve University Research Collaborative, she saw firsthand how medical science runs

squarely into a welter of social, cultural, political, and economic realities. How else could TB—a treatable, curable disease—kill 26,000 people a year in Uganda and more than 1.6 million annually around the world? Dickman knew the role that poverty plays. She knew that in sub-Saharan Africa, economics and politics could strangulate medicine. She knew that doctors struggle to get the resources they need and that many patients lack access to health care. After a year in Uganda, she views the problems in a different light.

“I had known a lot of these things were true before I came here,” she says, “but once you’re here, you really see just how many things go into impacting a person’s health.”

Tuberculosis dates to antiquity. Egyptian mummies show signs of the disease, and the African societies living in what would become Uganda were probably already familiar with it when the British colonized East Africa in the late 1800s. Europe’s TB epidemic, which had raged since the 1600s, had peaked by then, but another was going strong in North America.

In the 20th century, improved public health and antibiotics would help contain TB in

sleuthing—looking at whom treatment fails and why. Through DNA fingerprinting, Dickman studied whether some patients whose treatments failed carried more than one strain of *M. tuberculosis*. She suspects that drugs for one strain can “miss” another strain a person is carrying, as a study in China found.

Throughout, she’s learned from watching Ugandan doctors like Luzze treat patients with a fraction of the resources available in the United States. “Because they don’t have a lot of resources to order tests on their patients, they think really hard about which ones are absolutely necessary,” she says. “In the U.S., you often just order them all without thinking too much about what it’s going to tell you.”

Despite the dedication of local doctors, the roadblocks to progress in fighting TB in Uganda can seem immovable. Few labs there can even take TB cultures. Some of Dickman’s samples have lived for the past decade in refrigerators that occasionally heat up during power outages. The year has tested her emotional bandwidth, Dickman admits.

“You sit down and see patients, and you feel like you’ve helped,” she says. “Then you find out

The neighborhood’s cramped houses, often shared by four or five families, are fertile breeding grounds for TB.

North America. But it thrived in Africa amid the rapid urbanization and industrialization of the colonial era; deteriorating social and economic conditions exacerbated the epidemic.

TB has rebounded everywhere in the wake of HIV and AIDS, especially in poorer countries. Of those who contract TB today, 95 percent live in the developing world. Most of the 2 billion people worldwide carrying *M. tuberculosis* will never get sick from it. But when HIV suppresses immunity, an otherwise resistant TB carrier succumbs more easily.

“HIV and TB make each other worse,” says Henry Luzze, research director of the Uganda–Case Western collaborative. AIDS has helped make tuberculosis the second-biggest killer in the world.

Luzze’s team is investigating how HIV and TB interact. The group is interested in the role tumor necrosis factor-alpha (TNF α), a protein produced by both HIV and TB, plays in advancing HIV. They are studying whether antiretroviral drugs can inhibit its production and slow the onset of AIDS.

The group is also doing some bacterial

later your cultures are contaminated and open up a paper and see that some bus crashed up in the countryside, and 16 people were killed. A lot of my days I feel on top of the world. And the next minute, I’ll feel like all I want to do is go home and go to bed.”

The research offers solace—Dickman believes her findings can help save lives down the road. This fall she’ll be back in Kampala, continuing her research on a fellowship from the Howard Hughes Medical Institute. “There are certain things now that people shouldn’t be suffering from. The thing is, you feel you can really make a difference with these diseases, because the problem seems so basic.”

Medical students often travel to other countries to work for short spurts on healthcare projects—Dickman did so in Kenya. The idea is to expose students to other cultures and health disparities in the developing world. Along the way, these excursions point some toward a career path in global health. For others, they deepen understanding of culture’s influence, probably making

them better doctors in the long run. For all of the benefits, students often use up more resources—in time and attention from the host institution—than they can contribute during their short stays.

“A student has enormous needs,” says Gerald Keusch, former director of the National Institutes of Health’s Fogarty International Center, which aims to improve health care in the developing world. (He’s now Boston University’s associate provost for global health and associate dean for global health in the university’s School of Public Health.)

“They’ve got to be taken care of. They need to find housing. They need to learn how to get around. Any bit of attention taken from patient care is a diversion from the underlying need.”

So Keusch and his Fogarty center colleagues decided to design a global health program that would reap more rewards in host countries. The time commitment—a year between third and fourth year—would attract only the most dedicated medical students. “No tourists,” is how Keusch puts it. The program also trains one medical student from each host country.

The Fogarty scholars spend a year on a mentored clinical research project in the developing world, helping to refine training, procedures, and treatments for use in areas known by experts as “resource-poor settings.”

Host institutions need to find out what works best, says Aron Primack, the program’s director (whose son is Pitt assistant professor of medicine Brian Primack, Res ’02).

“If you buy drugs, throw them on the dock, and say ‘So long,’ you haven’t really accomplished much,” he says. A big budget and good intentions go only so far.

“We need knowledge,” says John Mellors, professor of medicine and chief of infectious diseases at Pitt. Mellors worked with Dickman and Krista Pfaendler (Class of ’09), another Pitt med Fogarty scholar, on the Kenyan Pediatric HIV Project, which the two started along with their classmate Kasia Mastalerz (Class of ’09).

A retrovirologist who has worked on AIDS in Africa, Mellors says clinical research helps make the most out of any money spent in global health.

“We can’t just roll out programs we don’t know are effective,” he says.

Dickman, Pfaendler, and Susan Wong (Class of ’09) are the University’s first Fogarty scholars. (There were 23 from the United States.) Dickman and Pfaendler applied their Fogarty studies toward their scholarly research projects. This fall, Pitt med student Yetunde Olutunmbi



(Class of ’09) will travel to Tanzania as the fourth Pitt Fogarty scholar. There, the Nigerian-born, U.S.-raised Olutunmbi will study the link between maternal nutrition and fetal AIDS transmission.

Beyond their clinical research training, the scholars also learn problem-solving—how to deal with shortage, delay, and other common frustrations that hinder health care in poorer countries. Thuy Bui, the medical director of Pitt’s Program for Health Care to Underserved Populations and assistant professor of medicine, says such skills are vital when working in resource-poor areas in the United States, too.

“You have to use your clinical acumen and make decisions the old-fashioned way,” says Bui, who returns every summer to the hospital in Malawi where she worked as a Peace Corps volunteer doctor in the 1990s. Many of Bui’s students fret about the medical problems they’ll encounter in the developing world.

“They worry they don’t know enough about the science of malaria. I say, ‘You’ll be fine with that. The harder question is, What do you do when you have no more staff at the clinic? What will you do then?’ They don’t believe me until they get there.”

The first woman off the bench one day last fall at the Kanyama Clinic was in her 60s or 70s. She wore a skirt and headwrap made of chitenge, the colorful traditional cloth of Zambia. She was thin but did not look particularly sick.

Krista Pfaendler pulled on latex gloves and seated the patient on the exam table inside a tiny white room. Pfaendler had been in

From Zambia, Pfaendler (second from left) went to Tanzania to see former Fogarty scholar Anna Acosta and local healthcare providers.

Zambia a month and knew only a few words of Nyanja, the local tongue. (Zambia has 72 languages.) She had learned how to examine the cervix, watching the clinic’s nurse-midwife use forceps to apply cotton soaked in acetic acid (essentially vinegar), wait a few minutes, then check the color of the cervix. White tissue was a red flag for cancerous or precancerous tissue and meant a referral for more tests. The procedure, called visual inspection with acetic acid (VIA), is used in Zambia instead of the relatively costly Pap smear.

The day before, Pfaendler had sent all the clinic’s patients home after the nurse called in sick. When the nurse called in sick a second day in a row, Pfaendler kept the patients in the clinic while she made a call.

“I didn’t feel right sending them back,” Pfaendler says.

She phoned her supervisor, Mulindi Mwanahamuntu, a gynecologist who oversees a national cervical cancer screening program. He told her she could conduct the screenings with a peer educator in the room as a translator. If she had any problems, she could fetch one of the other medical officers in the clinic.

Pfaendler started the procedure.

“I knew what it was when I saw it and smelled it,” she says. The smell was necrosis, dead tissue caused by invasive cervical cancer. She’d only seen cases this advanced in textbooks. In all probability, the cancer had already spread.

On her third-year rotations at Pitt the year

before, Pfaendler had been alone with patients, making treatment decisions, but always with the approval of a nearby resident or attending physician. This was different.

“She was sick, and I was the only one there who could do anything about it. It was kind of frightening,” she says. She told the woman she needed to see a doctor immediately because she most likely had cervical cancer. Pfaendler knew the woman would likely get palliative care, at best. A biopsy later confirmed Pfaendler’s suspicion—the patient had inoperable cancer.

A week later, the woman approached Pfaendler on her way into the clinic. The woman seemed like a weight had been lifted from her. That surprised Pfaendler a little.

“She was all smiles and thanked me profusely for sending her to [the hospital],” Pfaendler says. “I think she was just appreciative to have someone listen to her and to give her an answer as to what was going on, even though I told her there was nothing we could do for her.”

Pfaendler grew up in a multilingual household in York, Pa. Her father is a German-speaking native of Switzerland; her American mother teaches French. She wasn’t put off by the dissection of a bull’s eye in school, unlike so many other kids, says her mother,

ried speculums back and forth from clinic to hospital to autoclave them for re-use. When the electricity quits, the clinicians still perform exams, using flashlights and natural lighting.

Parham, a University of Alabama at Birmingham gynecological oncologist with more than 20 years of experience in Africa, found an astonishing 94 percent of HIV-positive Zambian women tested had abnormal Pap smears. As with TB, HIV lowers the body’s natural defenses against the human papillomavirus, which causes cervical cancer. Consequently, cervical cancer is the leading cause of cancer-related death in sub-Saharan Africa, the killer of 270,000 women a year worldwide. Now that many HIV-positive women are taking antiretroviral drugs, they will live long enough to contract cervical cancer. With access to early detection and care, they will survive it. The clinicians can remove worrisome tissues through simple, quick procedures like cryotherapy, which destroys problem cells through freezing, or surgery using a small, looped, electrical filament. In Zambia, where the HIV rate is between 12 and 16 percent—and as high as 25 percent in Lusaka, where the clinic is located—the need for better screening and treatment is obvious.

But how to do it on a shoestring?

listening. CCPIZ has screened more than 7,000 patients so far.

While readying a room one morning this February for that day’s surgical procedures, Pfaendler found they were nearly out of lidocaine, a local anesthetic. A visiting doctor from Ukraine suggested they tell the 20 or so women lined up in a stairwell awaiting treatment to come back the following week. Pfaendler demurred. She knew many of them had traveled far and might not return. Even a 25-cent bus fare could deter those whose households earn less than a dollar a day.

Pfaendler couldn’t reach her supervisor. The hospital staff complained about the women in the stairwell (the clinic had no bench). The doctor again suggested they send the women home. Pfaendler still resisted. She had already learned that when women came to the clinic, you never knew if you were going to see them again. Soon, the staff found the lidocaine. They operated that day on the patients.

Susan Wong was in Beijing four years ago studying Chinese during the initial stages of the severe acute respiratory syndrome scare. When news arrived that SARS had reached the city, she watched pandemonium descend. Her music teacher left in the middle

“I think I came in with typical American bravado. I’m realizing I still have a lot to learn.”

Sue Pfaendler. She spent a month in Ecuador one summer during college with Child Family Health International, rotating through various clinics. The experience showed Pfaendler a potential career path, one that combined medicine with immersion in a different culture.

This past year, Pfaendler has learned the ins and outs of clinical research—including writing grants, getting consent, and building protocols. And as Thuy Bui predicted, she’s learned how to make things happen.

Groesbeck Parham, who runs the Cervical Cancer Prevention Institute of Zambia (CCPIZ), says there are two eras in the short life of his three-year-old program: “pre-Krista” and “post-Krista.” When she arrived last summer as a Fogarty scholar, Pfaendler was charged with organizing the center’s screening program. She received a crash course in what Parham calls “the entropic law of doom.” The clinic runs out of latex gloves; speculums get hung up in customs; the electricity goes out. For each hurdle, Pfaendler has learned to craft a solution. She and colleagues have fer-

Zambia is one of the poorest countries in the world, with a per-capita gross domestic product of \$1,000. Because they don’t have the money or the staff to run expensive diagnostic equipment, Parham and codirector Mwanahamuntu are refining homegrown techniques for the nine screening centers they have set up. Pfaendler spent much of her year studying one such method, digital cervicography, whose main component is a common digital camera. The camera—fitted with a macro lens—is wired to a television to image the cervix. Pfaendler says the method “greatly improves” diagnosis with VIA. And when women see their cervical lesions on the screen, they’re more likely to return for treatment.

For inspiration, Pfaendler can point to two Zambian docs, Mwanahamuntu and Graciella Mkumba, a consultant on the project. They have preached cervical cancer prevention on radio, on television, and at public events.

“They both have passion for this problem, and it rubs off on those around them,” Pfaendler says. It appears Zambian women are

of a class. “People had no information,” she says. “The public was left completely in the dark, reaching for anything.”

The experience made Wong think about how the public receives its health information. When she arrived at Pitt the next year, she volunteered at the health clinic of the Women’s Center & Shelter of Greater Pittsburgh, and later became a health literacy worker. As a second-year med student, she started a medical literacy program for Somali refugees in Pittsburgh, along with fellow student Olutunmbi.

This past year, Wong has been a Fogarty scholar in Nanjing, at China’s National Center for STD and Leprosy Control. After a 25-year absence, syphilis has returned with a vengeance in China, and many worry that HIV might not be far behind. Researchers elsewhere have found that genital ulcers—like those caused by syphilis—might facilitate HIV transmission. With her Chinese colleagues, Wong is studying whether there is a “dual epidemic” of HIV and other sexually transmitted diseases. She says she’s become particularly interested in the



ABOVE: A year in Nanjing gave Wong (not pictured) a chance to forge new connections with her extended family. RIGHT: Friends from work helped Wong (second from left) navigate the local culture as she studied STDs.



feminization of STDs in China.

The rise of syphilis there is tied to a perfect storm of biology, economics, politics, and social factors. With the discovery of penicillin in 1939, syphilis, which is caused by the spiral-shaped bacterium *Treponema pallidum*, became easily treatable. Syphilis was prevalent in China until Mao Zedong came to power in 1949. Mao's sweeping public health campaigns were effective, if brutal. (He sentenced sex workers to "re-education camps.") In the ensuing years, China's population had virtually no exposure to *T. pallidum* and became vulnerable to it. The disease re-emerged in the 1990s with the introduction of capitalism and a growing sex trade.

The rate of syphilis cases per 100,000 people skyrocketed from 0.17 to 6.5 between 1993 and 1999. Congenital syphilis, passed from mothers to infants, has increased 72 percent a year since the early '90s.

Wong is seeing how taboo can contribute to epidemics.

While analyzing test results for a large STD survey in China this year, she noticed that some patients reported they'd never engaged in risky behavior, yet their serology tests showed that they, or people they had slept with, had.

Doctors, too, sometimes skirt topics like homosexuality, drug use, and prostitution. Wong heard one doctor tell an STD patient, "Don't go out too much. Cut down on drinking and smoking," to avoid future infection.

At the same time, she's seen Chinese doctors and scientists on her team determined to eradicate syphilis. They've created a large-scale surveillance system on the fly and provided inexpensive, patient-friendly diagnostic testing, even in the poorest corners of the country. They've also pressured the Ministry of Health

to take syphilis seriously. "I was impressed that, despite the disarray and adversity I often felt in the country, major public health initiatives were still being tirelessly fought for."

Her father emigrated from a town near Nanjing in his teens. Yet Wong had a hard time navigating China's complex social order.

"I think I came in with typical American bravado. I'm realizing I still have a lot to learn," she says. Being Chinese-American, Wong says, "I thought I would understand how things worked there. There's a way you're supposed to interact with your colleagues, and I just didn't know how it worked."

Still, she's drawn to the place. "When you see something happening to people who share your heritage, it just hurts," she says. She feels less like an observer now; she is thinking more about how to contribute to solving some of the public health challenges the country faces. Being sensitive to the cultural context has been critical in that evolution, she says.

She'll be back in China this August. On a Dean's Fellowship from the medical school, she'll mine data from the country's largest hotline to study the relationship between domestic violence (specifically, intimate partner violence) and suicide. Unlike in the United States, most suicide victims in China are female. Wong wants to know why so many women there choose suicide.

Those who know Wong have been impressed with her sensitivity.

Lynn Hawker, former director of counseling services at the Women's Center & Shelter in Pittsburgh, said when she first heard that a med student wanted to research eating disorders among residents, her hackles went up. Hawker had seen plenty of experts come

to the shelter "who want to diagnose these women with a problem." Not so with Wong. "She wanted to look at [eating disorders] from the point of view of the women, not just from a clinical point of view. She was looking at how eating became part of the abuse. When the women talked to her, they had a real sense that she cared," Hawker says.

Wong's parents worry about their daughter's generous spirit. As an undergrad at Brown University, Wong devoted time—even during finals—to helping Southeast Asian refugees she had befriended in Providence, R.I.

"I said, 'Why are you so busy doing all these things for other people?'" Kai Ling Wong says. "She'd say, 'Don't worry, Mommy, I can handle it.'"

When Wong broke the news that she'd be taking time off from med school to spend a year (and counting) in China, Kai Ling Wong was concerned: "We said, 'Why don't you finish medical school and become a specialist?'"

Perhaps later. In the meantime, Wong is considering returning to China as an MD to promote health education or work in epidemiology. She thinks of her year in Nanjing as the first step in a long-term relationship. It is as if she were pulled back by magnetic forces.

She draws confidence from her friends in Nanjing—Chinese grad students and young physicians—who have helped her navigate "China life." They've discussed problems with their families and work. The relationships marked an important shift for Wong.

"It meant a lot that they felt they could trust me," Wong says. "I was afraid that I would always be considered an outsider to them. It made me believe that I had broken ground in China." ■