Meg Quimper received a travel scholarship from Pitt's Center for Global Health to conduct global-health research in Malawi. She worked with Project Peanut Butter, a program that provides nutritious, high-calorie peanut paste to children with severe acute malnutrition. TOP: The factory in Blantyre, Malawi, where the fortified peanut butter is produced. LOWER LEFT: At Chikweo Health Center in southern Malawi, families listen as health care workers explain how the clinic runs. LOWER RIGHT: Quimper administers antibiotics to a child enrolled in a study of treatment for an intestinal disease that's widespread in rural Malawi. OPPOSITE PAGE: A child tastes the therapeutic peanut butter for the first time. This therapeutic snack time "could be quite messy, but it was always fun to watch," says Quimper.

Photos courtesy Meg Quimper

WHEN A PATCH OF SHADE IN RURAL AFRICA REVEALS A CAREER PATH

BY ELAINE VITONE

PASSIONS FOUND

They left before dawn, lumbering through the darkness along the unpaved roads of rural Malawi, a southeast African nation slightly smaller than Pennsylvania. The sun rose, and flatlands rolled on around them for miles in every direction. Some days they drove for three hours before reaching their destination: usually the lawn of a health clinic, sometimes just a patch of shade beneath a baobab tree. Waiting for them in the rising heat of the cloudless summer morning would be a host of hundreds—mothers who'd been carrying their children on their backs for just as long as the team had been driving. Some families had been walking for days.

"There's not really a line at that point," Meg Quimper recalls of those hours in the din of crying babies and the occasional bleating goats and clucking chickens. "It's just a mass. You just get in this rhythm." The mothers undressed their children, and Quimper and her fellow volunteers set up their mobile clinic and assessed each child for signs of malnutrition: either what's known as marasmus—which whittles down the body to mere skin-on-skeleton—or kwashiorkor—a swelling of fluid that puffs out the belly and cheeks. The team checked for anemia and measured the children's weight/height ratios and the girth of their upper arms—one of the first places a human body loses muscle mass when starvation sets in. The workers also checked the children's feet—the easiest place to find kwashiorkor swelling.

"The kids are going crazy, and I can't blame them," Quimper says of that line with a sympathetic smile. "I wouldn't be happy either if I were naked and getting passed around like that in the morning." Her voice turning somber, she adds that

the hardest part was seeing the kids who were too lethargic to be scared, too swollen-footed to walk, too severely malnourished to even hold up their own heads.

Quimper is one of three Pitt School of Medicine students who conducted international health research last summer with the help of travel scholarships from the University of Pittsburgh Center for Global Health. The scholarships are intended to help students address compelling global-health issues, particularly in the developing world. Since its inception three years ago, the travel-grant program has awarded $120,000 to 37 graduate students in the University of Pittsburgh's six health sciences schools, as well as in its Graduate School of Public and International Affairs and School of Law.

All three of the School of Medicine students who conducted research abroad this summer had been to their sites before. Earlier volunteer or professional experiences in Africa had inspired them and put them on a path toward global-health research. Traveling abroad, away from the comfortable and familiar, has helped them find their passion.

Thuy Bui, medical director of Pitt's Program for Health Care to Underserved Populations, has advised all three students in some capacity. "What they share is a yearning and audacity to tackle big challenges—of logistics, culture, language, resources—to understand the diseases and conditions affecting the bottom billion and the complexities of the necessary interventions," she says.

As an undergraduate, Quimper spent 10 weeks with this same mobile clinic in Malawi. It's part of an organization called Project Peanut Butter (PPB), so named because, after assessing each child, it sends malnourished children home with high-calorie, fortified peanut butter known as Chiponde (the full name is Chiponde Plumpy'nut). On a steady diet of this protein-packed PB, the kids who'd been totally unresponsive their first day at Chiponde clinic are soon "going crazy," just as they should. Most reach a normal weight in eight weeks or less.

"It's pretty amazing to watch and really rewarding," says Quimper. "You see them start running around and acting like kids."

On that first trip, Quimper worked with PPB founder Mark Manary, a pediatrics professor in the School of Medicine at Washington University in St. Louis, on a study of zinc deficiency in rural Malawi. The team established that this problem was prevalent in the population and, furthermore, that it was most likely caused by the intestinal disease tropical enteropathy.

Although not much is known about the mechanism of the disease, it has been shown to respond to antibiotics. So, this summer—just after Quimper and Manary's first study results were published in *Pediatric Research*—Quimper used her Pitt travel scholarship to return to Malawi and take the work a step further. The team completed a double-blind study to test whether adding antibiotics to the Plumpy'nut would make a better butter—one that speeds recovery—and how cost-effective such a regimen would be. The final data analysis will likely start this spring.

In Malawi, when you get sick and go to a hospital in a rural area or even a larger town, chances are you won't see a doctor. The only MDs in Malawi work in what are called central hospitals, of which there are only four. For the routine medical complaint—be it a sore throat or AIDS—treatment is in the hands of mid-level clinicians (the equivalent of nurse practitioners or physician's assistants).

Mid-level clinicians are in short supply and are largely on their own. There's no supervision, no feedback, and little opportunity even to witness the effects of their work. Typically, patients see whoever happens to be working on a given day at these walk-in sites.

Malawi's mid-level clinicians follow a thick book of guidelines adapted from those of the World Health Organization; the book contains a series of scenarios designed to speak to the majority of the population. "It's sort of an if-then-else construct," says Zach Landis Lewis, borrowing a phrase from computer programmers—which he does often because, well, he is one. He's also a graduate of Pitt's Master of Library and Information Sciences program, which may contribute to his having the well-read, warm, what-can-I-do-for-you sensibilities of a good librarian. These days, Landis Lewis is a fourth-year PhD student in the School of Medicine's Department of Biomedical Informatics.

Following the guidelines consistently, Landis Lewis explains, can be a challenge for Malawi's mid-level clinicians for various reasons. But in the case of AIDS, the challenge is particularly daunting because those guidelines are a moving target. As the population becomes resistant to the first-line drug treatment, the treatment begins to fail more people. Eventually, it's phased out and replaced by a second, and then a third, and so on.

In 2003, Landis Lewis took a job leading a software-development team in launching an electronic medical records system for Malawi. It was a project of Baobab Health, a Malawi-based nonprofit organization founded by Bui and Gerry Douglas (PhD '09), who are married. Landis Lewis began his work in Pittsburgh, and then, from August 2005 to July 2006, he and his wife, Deborah Landis Lewis (MD '06), lived in Lilongwe, Malawi—she took a year off from med school during which she volunteered at Bottom Hospital, which performs 12,000 deliveries a year with only two consultant ob/gyns.

"Deb's work has definitely been an inspiration to me and others," Zach Landis Lewis says.

With his travel grant, he spent a month back in Malawi this summer doing a feasibility study for what he envisions as the next phase for his program. Perhaps clinicians could receive regular automated feedback, he posited. He met with a few clinicians in Malawi, who welcomed the idea and gave him some suggestions.

For now, Landis Lewis is examining the areas where clinicians have room to improve, particularly in spotting the two most vexing problems with AIDS treatment: management of side effects and treatment failure. Malawi is in the middle of scaling up antiretroviral therapy. The government has about 300,000 people on treatment and aims to eventually treat the entire population of AIDS patients, which is currently about one million.

"As they get more and more people on treatment, they start to do better and better," says Landis Lewis. "Unfortunately, that also means resistance is going to increase. Helping clinicians to recognize that that's happening is going to be very important."

"Zach's work is tremendous," says Bui. "I expect a lot from him in the future."

When second-year MD student Mingyi Huang began his door-to-door survey project this summer in Mityana, Uganda, he decided to skip every other house—he wouldn't need every single family in the district for his data sample, he reasoned. But when people saw him pass them by, they chased after him.

"It's very different from doing a survey here," Huang says with a laugh. "Everyone was just so eager to help."

Huang encountered plenty of this disarming generosity while in Uganda. Even Huang's translator, Noah Kintu, who worked seven-hour days with him four days a week for more than

A few years ago, Zach Landis Lewis developed an electronic medical records system for health care workers in Malawi. This summer, he laid the groundwork for an upgrade to his system: automated feedback for clinicians. TOP RIGHT: Landis Lewis (left) at his going-away party in 2006, after he spent a year living and working in Malawi. TOP LEFT: A rural district-hospital HIV/AIDS clinic where Landis Lewis observed and interviewed clinicians this summer. MIDDLE: A health care worker uses Landis Lewis' system to register patients in a pediatric ward at a district hospital. LOWER LEFT: A wall in the clinic where health care workers have taped informational handouts. "These are good indicators of their information needs at the point of care," says Landis Lewis. LOWER RIGHT: Entrance to a district hospital.

Courtesy Zach Landis Lewis

a month, had initially assumed he was working for free—and was fine with this. (Huang did, of course, pay Kintu for his services.)

Huang is studying risk factors associated with the spread of malaria, which is easily the biggest public health problem in Uganda. Malaria spreads through the bites of female mosquitoes, infecting each host with one of five *Plasmodium* parasites. Once in the body, the parasite sets up shop in the liver, where it's able to escape the notice of the immune system. Within weeks, the parasite multiplies and leaves the organ, infecting new red blood cells over and over again in waves that cause a cycle of debilitating, flu-like, feverish spells—and in severe cases, fatal seizures.

It's a difficult disease to study. The hours-long fevers course through the body in cycles every few days, and this can go on for weeks. In places like Uganda, where the disease is so widespread and undertreated, it's hard to know when one infection stops and the next one begins. Many Ugandans can't afford hospital stays or even manage traveling to the hospital in the first place. Drugs are in short supply at the hospitals, which are government-run, and counterfeit drugs are rampant. There is no widely available vaccine for the disease.

Many people told Huang it was not uncommon to be sick four times in one month, and health care workers told him that 80 to 90 percent of the patients they see are malaria cases. Whenever anyone comes in with any possible sign of the disease—headache, fever, abdominal pain, diarrhea, and so on—they're automatically treated for malaria.

"It's challenging," says Huang. "That's why my main goal is prevention."

Huang asked survey respondents about their incidence of malaria and about the steps they take to avoid it—which might include insecticide, insect repellant, mosquito nets, and what time they close their windows at night (prime time for mosquito feeding).

In particular, Huang targeted the two highest risk populations: children under 5, who have no immunity and suffer the disease's ill effects the worst, and pregnant women—or rather, their fetuses—who are even more vulnerable. Children can suffer brain damage, and in pregnancy, malaria heightens the risk of stillbirth, low birth weight, and birth defects.

Huang is still analyzing the data, but thus far, he does have some startling numbers on incidence. It appears that 65 percent of children age 5 or younger in the sample had malaria within two months of the survey. Huang is spending the fall sifting through his data with the help of Pitt's Clinical and Translational Science Institute. Eventually, he'll compare the incidence of individuals who have contracted

malaria to the prevention methods they use in hopes of uncovering the most effective means of heading off the spread of the disease.

Like Quimper, Huang chose a research site where he had been before. In 2008, as an undergrad, he'd volunteered at a Uganda primary school, where he taught health and nutrition classes. He'd also organized and fundraised for a rainwater harvest system and garden as well as for a concrete floor for the classroom. And he'd made a few friends, with whom he was able to catch up this summer.

"It's really hard," he says. "The more people you meet, the more people you want to help."

When she first came to Malawi, Quimper struggled with not being able to help everyone she met, too. Some mothers would follow the Chiponde regimen to the letter, but two months later, the kids were still malnourished. That meant something else was wrong, too—most likely, they had AIDS.

Antiretroviral medications are free for children, but when Quimper was in Malawi this summer, there were no HIV tests availble in the country. The government won't issue the therapy without a positive test.

"I guess you kind of expect this sort of thing to happen in a very resource-poor setting," she says. Yet, Quimper adds, it's hard to know when such obstacles will show up.

Manary, Quimper's Project Peanut Butter mentor, encouraged her to focus on nutrition. That was the problem they'd set out to solve, and the problem they had a better handle on than others did. "That's something I learned from him," says Quimper. "You kind of pick a problem, and you do what you can about that. You can't worry about everything else—or you're not going to accomplish what you set out to do." Another lesson she learned from her global health research: Set out to do what you're passionate about.

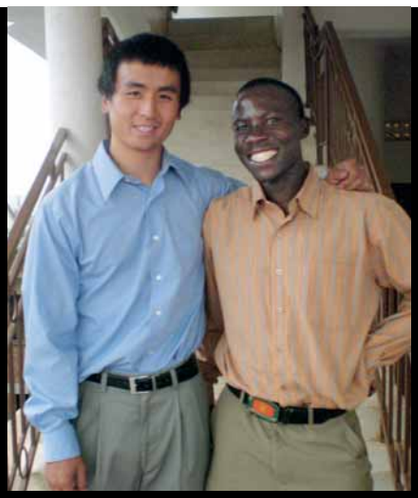
One day at Chiponde clinic, a mother brought her child—a skinny 2-year-old—in at 7 a.m. and left him there all day. He was malnourished, and his fingers had been broken and healed askew. Throughout the day, Quimper and her fellow volunteers kept an eye on him as best they could, all the while wondering what kind of monster of a mother would leave him like that. When the mother came back at the end of the day, the nurses laid into her.

"The mom was stoic," Quimper recalls, "just not responding. And then she just started crying and told us what she was going through."

The woman's husband had died, and she'd been taken in by another man. This stepfather was the one who had broken the child's fingers—because the child had wet the bed. The stepfather had forbidden her to take the baby to Chiponde clinic, so the mother had lied and said she was taking him to her sister's so she could go work in the fields. She'd figured the Chiponde volunteers would watch him, and they did.

Realizing that this mother was so desperate that this was her best option—to marry a man who beat her child, because she had no rights—was one of many moments that resonated for Quimper. Through her summer project, she has learned the importance of listening, of keeping an open mind. And just as Manary had decided it was unconscionable to allow severe acute malnutrition—a very preventable condition—to be the most deadly killer of children under 5 worldwide, Quimper is finding her own calling in women's health and rights.

Bui sees a lot of similarities between the Pitt med's three scholarship recipients. Each of them returned to Africa to implement a new idea, she points out. "They are all rather quiet, gentle people but ... so effective. They have the personality that breeds tolerance, flexibility, resilience, and ingenuity—important qualities for success in low-resource settings. I believe that the small investment made by the Center for Global Health and the University is already life-changing and will have lifelong career impacts for each of them," Bui says. "That's the best rate of return one could ever ask for." ■



Mingyi Huang is studying malaria in Mityana, Uganda. After conducting door-to-door surveys last summer, he's now comparing individuals' reported incidence of malaria against their prevention methods. ABOVE: Huang (left) with his translator and good friend, Noah Kintu. RIGHT: The chairman of the village of Nakibanga guides the team along a footpath that leads to the home of a survey respondent.

Courtesy Mingyi Huang