Tracking tropical disease

You may not hear an epidemiologist quote a politician very often, but Steven R. Meshnick, MD, PhD, has been known to.

“As the late Senator Daniel Patrick Moynihan once said, ‘You can’t solve a problem until you first learn how to measure it,’” says Meshnick, who leads a highly collaborative Gillings Innovation Laboratory project to quantify cases of HIV and tropical disease in the Democratic Republic of the Congo (DRC).

Infectious diseases are the leading cause of death and disability in developing countries such as DRC. Yet remarkably, international health and development organizations don’t have good figures on how many people suffer from these diseases.

“There aren’t reliable estimates or maps of where people are,” says Meshnick, an epidemiology professor at UNC Gillings School of Global Public Health. “This is a burning public health problem.”

And he’s about to help extinguish it, first for the DRC and then for other countries that undertake similar projects. In April 2010, Meshnick planned to share his team’s results with the DRC’s Ministry of Health, after which the team was to write formal reports of their findings. Such information will allow aid groups to make better decisions about where to expend money and resources.

Meshnick’s interdisciplinary team has spent more than a year analyzing dried blood-spot samples for prevalence of disease. The team includes epidemiologists, geographers, molecular biologists and tropical disease experts.

Under the guidance of three doctorate-level Congolese researchers, two labs in Kinshasa, DRC, are extracting serum from samples to gauge levels of African sleeping sickness. At UNC-Chapel Hill, the lab is measuring HIV and malaria.

Researchers at UNC include epidemiology postdoctoral fellow Steve Taylor, PhD, microbiology doctoral candidate Martha Clark, geography doctoral candidate Jane Messina, assistant professor of microbiology Julie Nelson, PhD, and associate professor of geography Mike Emch, PhD.

The team records where people who have the diseases are located. A high prevalence of HIV was found in the war-torn eastern areas, for instance. There also is a high prevalence of malaria not only in rural areas, as expected, but in densely populated areas around Kinshasa.

Dr. Steven Meshnick (right) works with Kashamuka Mwandagalirwa (left) and Jeremie Muwonga to sort dried blood-spot samples.
If you visit Tom Butler’s hog farm in Harnett County, N.C., you might spot a covered trailer bearing the faint logo of a rodeo clown.

But don’t think there’s funny business inside.

The unlikely laboratory is the place where Mike Aitken, PhD, chair of UNC’s Department of Environmental Sciences and Engineering, is conducting research to stem water and air pollution that comes from treated hog waste, a big issue in North Carolina, the second largest pork-producing state behind Iowa.

Through a Gillings Innovation Lab, Aitken and his team purchased the trailer second-hand. The ESE Design Center equipped it to operate as an onsite laboratory. Now parked by a hog-waste lagoon at Butler’s farm near Lillington, the lab is testing Aitken’s idea for removing ammonia, a noxious form of nitrogen, from the waste.

Ammonia is a desirable fertilizer, but too much of it damages soil and denigrates groundwater. “There is more nitrogen produced from hog waste in eastern North Carolina than could ever be used for crops in that region,” Aitken says.

Furthermore, when farmers spray ammonia-rich waste on crops as fertilizer—a common practice—much of the ammonia is released to the atmosphere, generating the smelly odor...