The small kingdom of Lesotho has one of the highest rates of tuberculosis in the world. Containing the virulent epidemic requires a population-scale approach that reaches even itinerant populations. Andrea Howard, MD, MS, partnered with TEBA, an African employment bureau, to text diagnoses and treatment reminders to the cellphones of migrant workers from Lesotho laboring in neighboring South Africa. “Because of the nature of their work, these individuals are hard to monitor,” says Howard, “but we noticed everyone has cellphones.” In the first nine months of the program, more than 51,000 people were screened for TB, and 166 cases were diagnosed.

Howard is in good company. Throughout the Mailman School, investigators are incorporating mobile technology to bolster health for marginalized communities and collect real-time data to advance health, especially among underserved populations worldwide. Alwyn Cohall, MD, for example, reaches minority youths in Northern Manhattan with text-message alerts promoting risk reduction of HIV and STIs. Another project—work by Jessica Justman, MD, with Columbia Engineering faculty—turned smartphones into mobile HIV-testing stations in Africa through hardware and software modifications.
A sampling of other projects underway:

**Pollution Cycle**

Cyclists breathe faster and more deeply than pedestrians, increasing their exposure to air pollutants with each breath. This summer, Darby Jack, PhD, partnered with public radio station wnyc to recruit bicycle-riding volunteers willing to don a personal pollution monitor mounted in a mesh vest. Jack will track the volunteers’ routes using a smartphone app to collect global positioning data, then pinpoint the locations where exposure peaks. The findings on inhaled pollutants can inform city planning, says Jack. “How can we route bicycle paths and create amenities that minimize exposure?”

**Looking for Love**

Grindr, Bender, GROWLr, and similar smartphone dating apps marketed to gay or bisexual men may increase users’ chances of contracting HIV and other STIs. Eric Schrimshaw, PhD, compared the apps with face-to-face methods men use to find partners and found cause for concern. “Users of these apps,” says Schrimshaw, “are at greater risk for STIs than from other high-risk activities like group sex or going to sex parties or bathhouses.” The trouble, he says, is that profile prompts don’t elicit users’ STI status or desired level of intimacy. “The next step is to work with app makers to include this information on expectations and STIs as fields in the profiles.”

**On the Ground**

In Rio de Janeiro, Brazil, the government lacks reliable street-level data on living conditions. Working with Medtronic Philanthropy, Gina Lovasi, PhD, is putting researchers on the streets to record infrastructure details, complete with global positioning tags. Staffer Daniel Sheehan tailored Fulcrum, a data collection app so that Lovasi’s team could take detailed notes and even upload photos shot with their smartphones. Lovasi plans to share the data with policymakers. “How can we route bicycle paths and create amenities that minimize exposure?”

**Finding Clues**

Tracking teens’ menstrual cycles isn’t easy, but the resulting data may hold clues to lifelong health. To get the most detailed and up-to-date information, Jasmine McDonald, PhD, and Lauren Houghton, PhD, partnered with developers at Clue, a period tracking app, to collect data. “We’re looking for connections between women’s periods and a host of chronic diseases associated with the menstrual cycle,” says McDonald. The current pilot will last three months, but Clue won’t limit the scientists’ access to new data. “As long as the subjects consent and keep using the app, we can collect data,” says Houghton, “so the cohort can go five, ten years, or longer.”

**Achievements in Africa**

In 2014, ICAP received a 5-year, $125 million award to perform population-based HIV-impact assessments of 20 countries in sub-Saharan Africa. Using tablet computers and linking the data with point-of-care HIV test results to document the HIV epidemic and the reach of treatment programs in each country. The project builds on ICAP’s HIV survey of more than 12,000 households in Swaziland, done in collaboration with the country’s government. “This is an opportune moment,” says ICAP Founding Director Wafaa El-Sadr, MD, MPH ’91, “to take stock of what has been achieved in confronting the HIV epidemic in Africa.”

**Mass Messaging**

Influenza can be costly, even deadly. Some youngsters need two doses of the influenza vaccine in a season, but many don’t get both. Melissa Stockwell, MD, MPH, sent computer-generated, personalized text messages reminding parents of the second dose. Pediatrics printed her results: The texts boosted full vaccination by 15.6 percent. Another study uses texts to monitor respiratory infection rates. Preliminary finding: 75 percent of participants with signs of infection don’t seek care. To assess the real disease burden, community-based surveillance is vital. “It’s just as easy to text 1,000 people as one person,” Stockwell says. “The potential lies in the ability to offer personalized messages, but in a scalable way.”