

# India wages hi-tech war on ancient TB scourge

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In this Friday, Oct. 19, 2012 picture, tuberculosis patient Kallu, 36, who also suffers from HIV, gives his fingerprint as part of a verification program to Operation ASHA program counselor Shammo Khan as he sits on a bed in the courtyard of a relative's home in New Delhi, India. Private companies, aid groups and the government have embarked on a flurry of innovation to modernize India's archaic anti-tuberculosis campaign and fight the spread of frightening new drug resistant strains threatening to cause a public health nightmare. (AP Photo/Kevin Frayer)

(AP)—Shammo Khan walks into a dusty courtyard that reeks of garbage, searching for the fingerprint of a man exhausted by HIV, drug withdrawal and the tuberculosis lesions hijacking his lungs.

She opens her laptop on his rope bed, prods the emaciated man to log in on a fingerprint reader and watches him slowly and painfully swallow a handful of [TB drugs](#) in an experimental program harnessing new technology to combat an ancient killer still ravaging India.

Private companies, aid groups and the government have embarked on a flurry of innovation to modernize India's archaic anti-tuberculosis campaign and fight the spread of frightening new drug-[resistant strains](#) threatening to cause a public health nightmare.

The government is replacing its haphazard paper system of registering [TB patients](#) with a Web-based database that theoretically could track every dose of medicine given to patients—and send them text messages when they miss one.

New tests powered by computer chips are being rolled out that can quickly identify drug-resistant patients so they can be given the proper treatment with a longer course of different medicines. And Operation ASHA, an independent health group, is using its fingerprint verification program to ensure patients take their full course of medicine to prevent the disease from mutating into a stronger strain.

"There's more innovation in the last year than in the prior decade in [TB control](#)," says Peter Small, a tuberculosis expert at the [Bill and Melinda Gates Foundation](#) offices in India.

In addition, the government is proposing to quadruple tuberculosis funding, is expanding its lab network and has ordered doctors for the first time to report all new [TB cases](#).

Tackling a disease that kills 300,000 people a year in a country of 1.2 billion required a concerted effort from everyone involved, said Ashok Kumar, the government's TB czar.

"There cannot be one single solution. There have to be buckets of solutions," he said.

India is struggling with more than a quarter of the world's new tuberculosis cases and has become an epicenter of new drug-resistant strains. Last year, doctors in Mumbai reported 12 cases of TB that had mutated into a nearly untreatable strain because of mistreatment and missed doses.

Despite the array of new tools, Zarir Udawadia, a Mumbai doctor who uncovered some of those mutant strains, said he remained pessimistic about India's ability to conquer drug-resistant tuberculosis. He doubted the government could exercise enough control over a health system where quacks with no training treat TB patients, and pharmacists routinely give out antibiotics without prescriptions.

Operation ASHA is working to prevent the creation of more new strains by fortifying the centerpiece of India's traditional anti-TB campaign, a program that pays counselors and private groups to verify patients are taking their medicine.



In this picture taken Wednesday, Oct. 17, 2012, a counselor looks at the x-ray of a patient suffering from both tuberculosis and HIV at an Operation ASHA program center in New Delhi, India. Private companies, aid groups and the government have embarked on a flurry of innovation to modernize India's archaic anti-tuberculosis campaign and fight the spread of frightening new drug resistant strains threatening to cause a public health nightmare. (AP Photo/Kevin Frayer)

Many patients resist the drugs' harsh side effects. They fall through the cracks by moving before their treatment is done or stop once they feel better.

Counselors only get paid for those who complete the standard six-month course of treatment, giving them an incentive to lie when patients drop out. Government statistics provided by the counselors show only 6 percent of patients don't finish treatment. Independent studies show defaults ranging from 15 percent to 33 percent. Some patients diagnosed

with TB never start treatment in the first place.

"There is no transparency, no accountability in the work they are doing. There is no one to verify what they are doing," said Shelly Batra, president of Operation ASHA.

To make sure counselors do their jobs, her group joined Microsoft Research and the nonprofit Innovators in Health to develop a program that uses cheap fingerprint readers to ensure patients actually meet with the counselors to take their medicine.

"Health data can be fudged," Batra said. "A fingerprint can't be fudged."

From the porch of a tailor shop in a southern New Delhi slum, Shammo Khan was running one of the 35 Operation ASHA centers using fingerprint-monitoring in the capital and two other cities.

Children, the elderly and hip, young men logged in by pressing their fingers onto the glass of a print reader connected to a handheld computer. Khan, 22, then handed them their medicine and watched them wash it down.

She checked the computer throughout her shift to see who had yet to come, and at the end of each day got an automatic text message telling her whom to chase down. She made house calls to the bedridden, such as the HIV patient.





In this Friday, Oct. 19, 2012 picture, tuberculosis patient Kallu, 36, who also suffers from HIV, waits after giving his fingerprint as part of a verification program to Operation ASHA program counselor Shammo Khan as he sits on a bed in the courtyard of a relative's home in New Delhi, India. The government is replacing its haphazard paper system of registering TB patients with a Web-based database that theoretically could track every dose of medicine given to patients - and send them text messages when they miss one. (AP Photo/Kevin Frayer)

Ravi Kumar, 28, said it was difficult as a wedding photographer with irregular hours to make it to the clinic, but the fingerprint reader kept him honest.

"If this would not have been here, I'd have sent someone else to take the medicine," he said, pointing at his little brother.

Most patients only need to be caught once. Others need a few lectures on

the risks they are taking.

"I keep explaining. I tell everybody that if you miss doses you will have to get injections, instead of six months it will be two years (of treatment), instead of a handful of medicines it can be 12," Khan said.

A few still don't listen.

Rahul Kumar, 19, said he stopped showing up at counselor Neema Mehta's clinic down a narrow lane outside a colony of garbage sorters because he couldn't tolerate the drugs, which can cause nausea and headaches. When Mehta called him, he shut off his phone. When she went to his home, he wasn't there. Mehta called her supervisor, who begged Kumar's parents to send him back. Still he didn't come. Then he went back to his family's village.

In August, after missing sporadic doses over his first four months of intensive treatment, he finally returned, saying he could now deal with the easier-to-bear maintenance phase of the treatment. It's not clear if his spotty compliance created a mutated strain.

Even so, Batra said fingerprinting has lowered her default rate to 1.5 percent. Now she wants to replace the computers with smartphones.

"We have to go the extra mile, we have to find the foolproof method," she said.



In this Monday, Oct. 22, 2012 photo, a tuberculosis patient waits with his face covered as another is given an injection at an Operation ASHA program center in New Delhi, India. India is struggling with more than a quarter of the world's new tuberculosis cases and has become an epicenter of new drug-resistant strains. Last year, doctors in Mumbai reported 12 cases of TB that had mutated into a nearly untreatable strain because of mistreatment and missed doses. (AP Photo/Kevin Frayer)

The Abdul Latif Jameel Poverty Action Lab, which is MIT-affiliated, is studying the program and if it can confirm its results it will encourage the government to expand it to India's 640,000 other tuberculosis counselors, said Chand Tulal Mazumdar, a research associate with the lab.

The government is already deep into its own tech overhaul.

Ashok Kumar, who took over India's tuberculosis program last year, is



working to transfer a haphazard system of cardboard charts and booklets to a new database that would enable the government to track each of its 1.5 million patients.

The database will have details of the patient, the counselor and the treatment, down to the last dose taken, Kumar said. It will take advantage of the 900 million cellphones in the country; If patients miss a day, the database will send them a text message, he said. When patients move—which often interrupts or ends their treatment—they can be electronically transferred to a new center.

The program can automatically send medicine to health centers running low and streamline payments to counselors who now complain they are getting paid two years late.

Kumar hopes to use the system to monitor treatment given by private doctors, whose poor care is contributing to drug resistance.

"Many times they are not giving the right dose, they are not giving complete treatment, they are not following the patient," he said.

Kumar is more cautious in modernizing the government's 13,000 testing centers, where technicians with microscopes use a TB test first developed in the 19th century that only catches about half the cases and can't determine if they are drug resistant. Kumar has bought 46 GeneXperts that use new technology to detect TB in less than two hours and also test for resistance to an important anti-TB drug. But the machines are expensive and won't work in India's summer heat or its routine power outages.

BigTec, in the southern city of Bangalore, is working to overcome those problems

Director Chandrasekhar Nair said his team developed a handheld, battery-operated machine that works in high temperatures and would allow minimally trained health workers to give a TB test in even India's most remote villages.

"Our device is basically something that you can put in a backpack and go around," Nair said.

The Truelab Micro PCR System uses a computer chip to run a TB test in under an hour. Another chip can test for drug sensitivity, he said.

The World Health Organization cautions it has yet to endorse the test and is awaiting further studies, and the \$12 per test—double that if the drug sensitivity is run as well—is outside the government's price range. Nair said he hoped to bring down the cost.

Nevertheless, public health experts say the device could stand as testament to the type of innovation India can bring to major health problems of the developing world.

"It's a very promising technology," said Dr. Ken Simiyu, a program officer with Grand Challenges Canada, a Canadian government-funded group that gave the project a \$1.3 million grant.

If Indian health experts can make full use of all this new technology, "they can really turn the tide," said Small, the TB expert at the Gates Foundation. "And if they don't, it's scary."

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