

SCIENTIFIC AMERICAN

February 23, 2009

What's the Rx for Drug-Resistant Tuberculosis? Hard Work--And Imagination

A rising star in public health is showing the world that the deadliest strains of tuberculosis can be treated anywhere

By Katherine Tweed



When he touched down in Maseru, Lesotho, in September 2007, Salmaan Keshavjee had to help get a hospital renovated and a lab built. But first, his colleague Hind Satti said that they must visit a patient nearly 40 miles (65 kilometers) away. The ride through the small and landlocked African nation that sits like an island inside South Africa dragged on for more than two hours over obliterated roads until Keshavjee and Satti reached a small mud home.

The house was so dark they could barely make out the six-foot-two (1.9-meter) gold miner. He was only breathing twice a minute. He weighed less than 90 pounds (40 kilograms). The patient was coughing up blood onto the dirt floor because of his multidrug resistant tuberculosis (MDR-TB). He was also HIV positive. "I thought he was going to die," Keshavjee recalls. There was little they could do at the time, so the doctors left the

dusky hut and drove back to Maseru with the intention of getting the man to the hospital in the capital.

Keshavjee was in Lesotho as part of the Boston-based nonprofit Partners in Health (PIH) to coordinate construction of a new TB hospital and lab. Despite having to set up shop in a country with some of the world's highest HIV and TB rates, PIH had the facilities up and running in less than one year. But at the time Keshavjee arrived at the end of summer to meet Satti, the hospital would not be ready for at least another month, so the doctors decided to rent an apartment in Maseru for the miner. While Keshavjee bartered with contractors about air filtration systems for the hospital and calculated lab staff size, he ensured the apartment would have everything from a kerosene lantern to curtains.

Keshavjee returned to Lesotho two months later. HIV patients with MDR-TB can die in as little as two weeks, but the patient was still alive. The man's wife had moved to town and was hired as a cleaner in the new hospital. It is a center of excellence, equipped with locally trained health care workers and lab technicians. It all cost less than half a million dollars. Still, Keshavjee was unsatisfied. He knew one hospital cannot cure an epidemic.

Keshavjee didn't set out to be a globe-trotter, but today he flies around the world showing people that what they thought was impossible in health care for some of the poorest regions not only can be done,

but is already happening.

Along with many other dedicated health workers and officials, Keshavjee is fighting drug-resistant TB. It is estimated that one in three people on the planet are infected with latent tuberculosis bacteria. The disease kills two million people every year.

When a person's immune system is weak, that infection can become active and contagious. Most patients can take a course of antibiotics until their tests come back negative. For others, who either do not finish their drugs or get the wrong ones, their TB can grow resistant to the two best and most effective therapies.

The result is MDR-TB. It is a ballooning health threat that has been reported in more than 80 countries. It can be 100 times more expensive to treat than drug-susceptible TB and, if treated improperly, MDR-TB can grow even more resistant.

Keshavjee, 39, with his bright smile and glossy black hair, relishes the challenge. "What frustrates me the most is one the lack of imagination," he says. He is not the first person to just call for a little ingenuity in tuberculosis treatment. PIH co-founders Paul Farmer and Jim Kim are known for their creative solutions in poor areas, and not taking "no" for an answer. But Keshavjee brings more than imagination to projects. He moves from highest levels of the World Health Organization to the swamps of southwest Siberia to sub-Saharan Africa establishing community care for TB patients who have been deemed "incurable".

Keshavjee thinks the rising rates of MDR-TB are unacceptable. "Poor countries are viewed differently and the expectation of what you can do with people is viewed differently," he says. It was that realization as a student that altered his course. As a masters candidate in public health at Harvard University, Salmaan was training to become an immunologist, studying T cells in a laboratory. He received a small grant to travel to Brazil to work with a potential vaccine for leishmaniasis, a parasitic disease that causes skin sores, but the project fell through. He tried to return the money when Richard Cash, a professor at Harvard, suggested he use the funding to go to Bangladesh to study diarrheal disease. "I thought my international health focus would be in the lab," Keshavjee says. "But then I got there and realized this is what I want to do—to look at things and find out why things aren't happening."

After completing his MPH from the Harvard School of Public Health, he took a detour to get a PhD in medical anthropology before getting his medical degree. Keshavjee spent a year in Tajikistan listening to impoverished people to find out how the drug distribution system affected them.

"He's extraordinarily gifted in being able to talk to people," says PIH's Kim, also a chief of the Division of Global Health Equity at Brigham and Women's Hospital in Boston. "He gives you the feeling you're just sitting at a kitchen table talking things over."

When he took over as chair of the World Health Organization's Green Light Committee (GLC) in 2007, which secures low-cost TB drugs for participating nations, Keshavjee didn't want to wait for countries to comply. Instead, he listens to what countries are trying to do and advises them on how to scale up their projects to meet GLC guidelines. "He is a rational person, and that doesn't seem like a big deal, but it is," says Sonya Shin, a doctor with PIH who has worked with Keshavjee in Russia. "He never lets his ego get in the way."

He started going into places with high MDR-TB rates, like Lesotho and Azerbaijan. In many places, like Lesotho, PIH has found one fix is as easy as buying a bus ticket. "This is not rocket science," Keshavjee says. "You're saying the person can't afford to take the bus to get free medicine that costs \$2,000, well why don't we give them a bus voucher?" So far, the number of projects involved in the GLC has doubled from 55 to 120 since he took over. "Salmaan brings a spirit of urgency and that's really great," Kim says.

Salmaan has landed in more than 20 countries in 2008 alone, mostly to assess what they are doing to bolster MDR-TB treatment. He is always willing to go the extra mile, says Fuad Mirzayev, who is also on the GLC. But Keshavjee knows his own limits. He doesn't travel without his own pillow. He likes a

comfortable bed. Kim points out that many people in global health have a trait of "incredible heroic self-denying." But Keshavjee, even with something as simple as carrying his own feathered headrest, knows what it takes to keep himself happy and healthy. "We see him at Harvard as really one of the future leaders not only here in Harvard, but in the world," Kim says. "Salmaan has a very sane view of what it takes to do this work for a long time."