



**Community-Based Effort in Zambia to Improve Tuberculosis Detection through Education and Use of “Sputum Depots” That Provide Diagnostic Tests.**

each year from tuberculosis. Africa desperately needs substantially increased investments in

research, health care systems, diagnostic laboratories, human resources, and public health services if it is to shed its heavy burden of suffering and death.

No potential conflict of interest relevant to this article was reported.

Dr. Chaisson is the director of the Center for Tuberculosis Research at the Johns Hopkins University School of Medicine, Baltimore. Dr. Martinson is the deputy director of the Perinatal HIV Research Unit, University of the Witwatersrand, Soweto, South Africa.

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## Worlds Apart — Tuberculosis in India and the United States

Vikram Paralkar, M.D.

I know the color of that blood; it is arterial blood. I cannot be deceived in that color. That drop of blood is my death warrant. I must die.

The British Romantic poet John Keats, trained as a physician and licensed by the Society of Apothecaries, gave himself this accurate prognosis in 1820 after an episode of hemoptysis. He realized that he had contracted tuberculosis, and tragically, he died soon afterward at the age of 25.

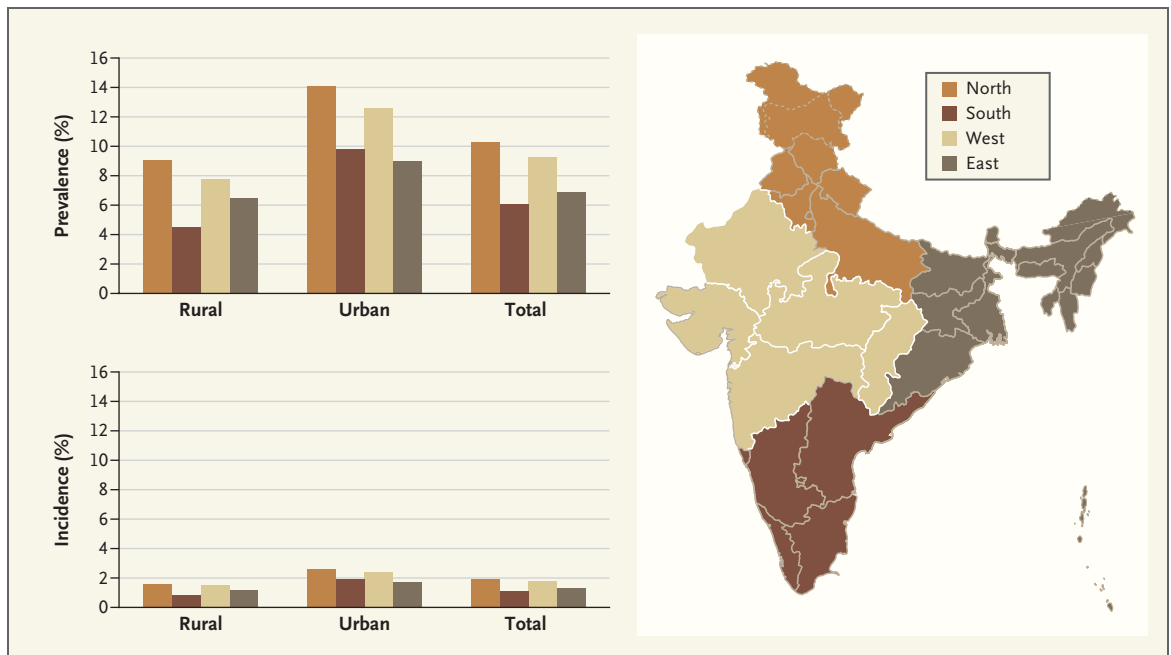
Less eloquent and portentous were the words of a patient I saw at Temple University Hospital's emergency department in 2007. “I coughed into my handkerchief and found a little blood,” he remarked simply. A

young man with no other medical problems, he was bewildered when, at the mention of this symptom, he was rushed into a private room and every person he saw thereafter wore a peculiar duck-billed mask. A negative-pressure room also awaited him; if he did have *Mycobacterium tuberculosis* in his sputum, he would be isolated and treated until he was deemed safe for discharge.

Three years earlier, I stood not in Philadelphia but in the general medicine ward of King Edward Memorial Hospital in Mumbai, India, where I trained. The wards were enormous gothic halls with stone walls and high-vaulted ceilings. Although they possessed a certain archaic grandeur, the wards housed patients in a communal space that

was not designed for the containment of infectious diseases. Whenever possible, patients with tuberculosis were situated in the farthest reaches, separated by an invisible line that the medical staff regularly crossed, often without masks. The proximity of these patients to immunocompromised patients, such as those with AIDS or cancer, was often unavoidable.

Although there are private hospitals in urban India that provide state-of-the-art care comparable to the care in Western countries, most people are treated at government and municipal hospitals, which, like my medical school, provide care to the poorest of the poor. The upside for us was that our medical training was extraordinary, due to the breadth and complexity of



Prevalence and Incidence of Tuberculosis in India, According to Region, 2005.

Data are from the Health Ministry of India.

the diseases we saw and the wide range of pathogens that we were exposed to.

Unfortunately, the term “exposed to” applied in more ways than one. By a cruel stroke of irony, one orthopedic resident developed tuberculosis of the spine. A classmate of mine developed tuberculosis-induced pleural effusion. Many more students probably underwent months of treatment without revealing their diagnoses. Even among India’s educated classes, tuberculosis carries a stigma.

The rate of confirmed infection alone is startling. Researchers at a medical school in northern India found an incidence of about 17 new cases of active tuberculosis per 1000 medical residents per year<sup>1</sup> (as compared with about 2 cases per 1000 in the general population<sup>2</sup> and 0.05 in the general U.S. population<sup>3</sup>),

and the prevalence of latent infection among health care workers at a rural medical school was more than 40%.<sup>4</sup> A significant predictor of infection was longer duration of employment in health care; moreover, the researchers noted that the prevalence of infection was probably underestimated because senior physicians, who have more years of cumulative exposure, were underrepresented. Genotypic analysis of *M. tuberculosis* in patients admitted to two different wards in Delhi revealed clusters of genetically similar strains among patients who had had overlapping hospital stays at the same institution — compelling circumstantial evidence of nosocomial transmission.<sup>5</sup>

The contrast between the developed and developing worlds in the impact and management of tuberculosis shows how far

therapies have advanced and how potent they can be if they are implemented successfully. A century ago, tuberculosis posed substantial challenges even to wealthy countries. Thomas Mann’s opus *The Magic Mountain*, set in an affluent sanatorium in the Swiss Alps before World War I, vividly illustrates the passivity of tuberculosis treatment before the advent of effective pharmacologic agents. Mann describes not only the cutting-edge therapies of the day — enforced rest, fresh air, morning walks, and even artificial pneumothoraxes — but also the peculiar psychological ecosystem of a community of people placed in constant close contact by a chronic and unremitting disease. The deaths of the sanatorium’s inhabitants, either from slow, progressive consumption or from rapid, massive hemoptysis, repeatedly

remind the others of their own mortality. Mann takes a philosophical lesson from tuberculosis, musing that “[life is] the existence of what, in actuality, has no inherent ability to exist, but only balances with sweet, painful precariousness on one point of existence in the midst of this feverish, interwoven process of decay and repair.”

Life with tuberculosis in India today seems similarly precarious. Nearly a century later — and 50 years after the development of effective treatments — India has lagged far behind developed countries in the containment and management of the disease. Despite the laudable progress that has been made in India in the 60 years since its independence, it remains challenged in fundamental ways. Social stigma often discourages people from seeking treatment for months, and when they do seek it, treatment is administered on an outpatient basis, since isolating otherwise functional people is rarely feasible. The treatment of latent tuberculosis with 9 months of single-drug therapy (the norm in the United States) is a concept found only in textbooks in India. If it were implemented, nearly a tenth of the population would require treatment.

The situation is further compounded by the growing pains of a democracy trying to unweave the threads of corruption from its social and political fabric. During my rural health rotation, I saw dedicated health care volunteers trek miles down narrow, muddy cattle paths to pro-

vide free directly observed treatment (DOTS) to patients in remote areas. Unfortunately, I also witnessed unscrupulous medical officers recording fictional patient names in their logbooks in order to meet government quotas.

***In India, many people with tuberculosis continue to slip through the net and into jostling crowds, with at most a thin handkerchief to stifle their incessant coughs.***

The World Health Organization’s 2007 report on global tuberculosis control encouragingly states that India’s Revised National Tuberculosis Control Program has expanded DOTS “to the entire country, with 100% geographical coverage in March 2006.” Although these steps forward are worthy of celebration, we must remember that statistics are only as good as the village-level data on which they are based. Many people continue to slip through the net and into jostling crowds, with at most a thin handkerchief to stifle their incessant coughs.

The distressing problem present in both the Alpine sanatoriums of a century ago and in the developing countries of today is the persistent burden of disease, once due to a lack of scientific understanding and now to a lack of infrastructure. I, born and raised in Mumbai, find it much easier to treat tuberculosis on the other side of the earth, where I can isolate patients with infectious diseases and treat them by the book, all at minimal risk to my own health.

Doctors like me, who have left their developing countries for the intellectual, social, or financial comforts of countries like the United States, are often awed by the medical resources that are available in the West for the control and elimination of diseases. Yet even as we use these resources, we grapple with the melancholic realization that we have abandoned a world that may have a far greater need for our skills. I moved to the United States to pursue a career in academic medicine and basic research and to participate in carrying medicine into the future. Am I doing a disservice to the greater good by not working at a tuberculosis clinic in a remote Indian village — a place where the nearest emergency department is hours away, where the electricity cuts out for a few days every week, where the water supply is unreliable?

My patient in the private room in Philadelphia is probably unacquainted with Thomas Mann and John Keats. He is also unaware that he is the latest warrior in the unending battle be-

tween Human and Bacillus. The complexities of the history of tuberculosis and its treatment mean little to him, and the musings and internal conflicts of the medical resident treating him concern him even less. He has questions about his condition, about the need for isolation, and about the tests that will be performed next. I enter his room wearing a mask, hoping to per-

form the one duty that doctors around the world, irrespective of their resources, must try their best to do: provide answers.

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Dr. Paralkar is a resident in internal medicine at Temple University Hospital, Philadelphia.

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