

Exploring Health Care and Medical Tourism in a Modernizing Society: Journey in Chennai, India

Janani Krishnaswami, MD

The Start of a Journey

I am riding in the front seat of a tiny Ford Icon, taking in the left-sided passenger view as we bump along narrow dirt roads. The driver is cheerfully unperturbed as he navigates various obstacles in our path: children, motorists, stray dogs, cycle rickshaws, carts of bright red tomatoes. By the end of my trip, my mind—and stomach—will be desensitized to the labyrinth of vehicles, pedestrians, and animal life constituting traffic in Chennai. But today is my second day; thus, I still shut my eyes in instinctive terror as our car swerves to avoid the mammoth trucks lurching toward us.

Chennai, India: A city in which I have never lived, but whose ancient culture shapes my roots. My memories of this south Indian city centered on its role as default destination of onerous family vacations. Back then, the sweltering summer weeks of bumpy rickshaw rides, obligatory extended-family visits and inevitable digestive woes felt more like forced medicine than my parents' claim of "relaxation." Yet these trips nurtured my subconscious appreciation for Indian culture, as I studied Sanskrit literature and trained as a student of Indian classical vocal music. Over the years, summer trips lessened in frequency, but my connection to Chennai grew tenacious as I pursued its art forms.

That connection had planted the seed for this trip. As an almost-physician, I was returning to Chennai with two specific goals: to provide medical service, while immersing myself in the culture inspiring my cherished hobbies.

Since my last visit (nearly a decade earlier), both of us had changed rather substantially. I'd moved across continents, worked for a behemoth investment bank and a tiny non-profit agency, studied economics in England and parasitology in Texas—and now, months away from medical school graduation, was embarking on a future career in preventive medicine and public health. In India, transformation permeated society. A patriotic, pro-tradition movement had sparked a nationwide flurry of renaming Indian cities in indigenous language (Bombay to Mumbai, Calcutta to Kolkata, Madras to Chennai) even while popular media captured evidence of India's resolute modernization: humble tea stalls replaced by Internet cafes, expansive rice fields now home to gleaming "tech parks," mobile *dosa-poori-masala* stands juxtaposed near freshly painted Pizza Huts, bright yellow auto-rickshaws lost in the roar of sporty Honda Citis.

And so it was thus, on this occasion of visiting a home I secretly feared would seem rudely foreign, that I found myself cowering in the passenger side of a Ford Icon.

A Snapshot of Daily Life in Chennai

Chennai operates in a chaotic, stubbornly functional context. First, people are everywhere. Chennai's 7 million people share a space of 180 square km, representing a population density of 24,231 people per square kilometer. (Los Angeles, one of the most population-dense cities in the US, has a density of 3170 people/km²).¹⁻⁴

Life in Chennai splashes boisterous color on the seemingly mundane. On the road, trucks groaning with loads of cargo are festooned with painted curlicues and canary-yellow paint jobs; shifting into reverse gear, they emit tinny renditions of various *bhajans*, Hindi film songs, or the national anthem. On nearly every corner, stores sell milk and pistachio (*"pistha"*) biscuits along with artists' paintbrushes, crochet kits, an array of sketchbooks, and Fevicol-brand craft glue. Street vendors wheeling carts of fresh vegetables, sugarcane juice and customers' folded laundry advertise their wares by shouting at the top of their lungs, creating a collective vocal cacophony that only a professional mother-in-law cooking in apartments above can interpret. Everyone loves music, and fittingly, every street in Chennai pulses to a perpetual soundtrack: Bollywood, classical, *bhajans*, instrumental mandolin/*veena*/violin, drum beats

of *tabla* and *mridangam*. And every December, the whole city celebrates the Chennai Music Season, a five-week festival featuring hundreds of heavily attended classical music and dance concerts, lectures, demonstrations, and performances.⁵

Religious diversity is often matter-of-fact on Chennai's streets, even as India's borders are caught in religious quagmire. Travel down one road and you will see a prestigious convent school facing a billboard that proclaims *Jesus Loves You*, catercorner to a procession celebrating *Ganesha Chaturthi* at a Hindu temple. On another corner, traditional Muslim prayer call echoes from a mosque tucked in between "Krishna Tailoring Stores" and "Muhammed and Sons Jewelers." Turbans, *burqas*, *saris*, suits, *dhotis*, dresses, *shalwar kameez*, pants and shirts ("pant-shirt" in Chennai-speak), and sometimes no shirts are all accepted Chennai attire. It can sometimes seem as though the city is in a state of perennial celebration of some festival or holiday, with the sight of a sequin-bedecked, palanquin-hoisting, hymn-chanting and dancing group in the street almost as commonplace as rush-hour traffic.

A Bit Lost

The address I've been given is "19, 12 Cross Street, Indira Nagar, Chennai." The car meanders through increasingly pot-holed, nameless dirt roads; I wonder restlessly how we know where we're going. "Oh, 12 Cross Street," my driver, Shekhar, had said confidently. "We'll get there, we'll get there. No problem." Shekhar, of course, never said we *couldn't* do anything. Drive across town in 20 minutes during Chennai's rush hour, which makes Rockefeller Plaza at Christmastime look like Germany's

Autobahn? "Of course, we'll get there, we'll get there. No problem." Everything is possible for Shekhar.

Except, apparently, finding this clinic. The car slows to a pathognomonic I'm-lost pace, and I peer worriedly out the window. Still no street signs. Flat-roofed cement houses—pastel pink, lime yellow, mint green—line the road, each enveloped by lush green creepers and vibrant hibiscus and jasmine. In lieu of door numbers, each house features a name painted in neat white letters atop an iron-railing fence. *Lakshmi Nivas. Swaathi. Sai Krupa*. Despite this decidedly non-numerical pattern, we creep by in hope of finding number 19.

The car pulls to a stop in front of a turbaned man idly chewing a betel leaf. Shekhar rolls down the window and beckons. "*Are, 12 Cross Street ennu irruku theriyama?*" [Hey, do you know where 12 Cross Street is?] he calls. The man spits out the leaf, squints for a moment and points. "*Angu left thirumbi, conju neru pettu, inooru ora right...*" [Turn left there, then go straight for a while, then another right ...]. I try to ignore the angry red betel stains on his teeth and instead concentrate on trying to understand the circuitous route. I'm lost after the first "left" and "right," but Shekhar nods in apparent excellent understanding. And we're off once again, narrowly dodging the cow that suddenly is in front of us, placidly turning its tail.

Surveying Chennai's Health

The context of health in Chennai is framed by a mammoth, decade-long rollercoaster ride of growth and development.

As India expanded its information technology (IT) sector and liberalized foreign investment laws,

wealth flooded into Chennai's economy. Chennai now serves as one of India's major IT and IT-related services exporter, with its newly constructed "IT Corridor" employing over 300,000 people. Upward mobility thus touches and transforms the lives of many once-poor Chennai residents.^{6,9} India's poverty rate declined over 50% from 1983 to 2007, and the 2006 South Asian Economic Report¹⁰ noted a "remarkable" reduction in the rate of absolute poverty in the region surveyed "primarily due to accelerated growth in India." Among Indian states, Tamil Nadu ranks in the top five in terms of level of urbanization and literacy rate and has a lower-than-average poverty ratio. And in the 2009 Global Rankings Quality of Life Survey—covering 254 cities and conducted by the international human resources firm ECA International—Chennai was the top-ranked Indian city in which to live.¹¹⁻¹⁴

Health care and health delivery are important beneficiaries of India's economic boom. The preceding decade's newfound wealth spurred grassroots efforts and nongovernmental organizations to fill basic public health needs: waste disposal, hygiene and sanitation, and access to clean water. Tangible examples include Friends of the Beach, an initiative in 1999 that installed garbage bins and public toilet facilities on Chennai's heavily polluted beaches and provides stable wages to slum-dwellers in exchange for beach cleaning and construction services.¹⁵ The World Bank-supported Tamil Nadu Health Systems Project is a hospital-centered public health effort; this five-year, \$110 million project will roll out electronic information systems in the state's district hospitals, streamline disposal of hospital waste and construct 24-hour OB/GYN centers.^{16,17} And in

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the realm of drinking water access, the successful completion of the Sai Ganga Water Project represented a milestone. This multimillion-dollar initiative provides safe drinking water to millions of Tamil Nadu citizens, including the very poorest communities and slum dwellers, via groundwater pipeline connections from the neighboring water-rich state of Andhra Pradesh.¹⁸

Such measures dent the devastating death toll wreaked by India's endemic infectious agents. Tamil Nadu achieved a near-100% target vaccination rate from 2007-2008, and the death toll from six major vaccine-preventable diseases is zero.^{13,19} Even once-rampant, "classic" developing world conditions are declining: in Chennai, malaria's incidence fell 43% between 2001-2008, and leprosy's prevalence is currently less than 1/10,000 in Tamil Nadu.^{20,21} Expanding health care infrastructure also spurs dramatic increases in medical treatment and diagnosis. In 2008, Tamil Nadu's patients obtained 19.4 million lab tests, 19,000 Pap smears, and 600,000 surgeries.²²

Despite such advances, however, poverty and poor health still trouble many residents of Chennai. Almost ten times as many infants die at birth in Chennai compared to Beijing; the average Chennai female can expect to live only about 67 years. The city's residents are served by about 1800 physicians, leading to a ratio of 42 physicians per 100,000. (In the US, the average is 286 physicians/100,000).²³⁻²⁵ Even as enterprising students graduate from Chennai's institutes of higher education, others drop out of poorly funded, deplorably run government schools where student *and* teacher attendance is optional, desks and chairs are a luxury, and basic infrastructure is in flux. For

example, a recent study found 38% of these schools lacked proper toilet facilities for its students. The city's overall literacy rate hovers at 73-78% (soaring from 46.7% in 1991), but literacy rates lag behind nearly 10-15% among poor classes, where sanitation, air pollution, and improper waste disposal hinders quality of life.²⁶⁻³⁰

The dichotomy between rich and poor is stark in gentrified locales like Besant Nagar. Here, idyllic gardens and glass-doored shopping malls featuring "export-only" clothing and goods cater to the area's upper-middle class. One corner turn away on the paved road to the beach, however, is Oduma Nagar, a fishing colony and slum. In the slums of Chennai, populations exceeding the size of small European countries coexist on a few square kilometers. For slum inhabitants, mundane needs and activities—bathing, garbage disposal, drinking water, and defecation—are daily battles. Garbage and human waste invariably ends up in the same water used for bathing and drinking, promulgating a vicious cycle of parasitic and communicable disease.³¹⁻³³

Entering the Clinic

A khaki-uniformed security guard paces pensively by the wrought-iron gate encircling the cream-colored house. He pauses as we pull to a stop. "*Idhu* doctor *veettu ab*, doctor *Krishna Raman*?" [Is this Dr Krishna Raman's house?] Shekhar questions the guard. I peer anxiously as the guard smiles and nods vigorously, briefly pondering the irony that the word for "doctor" in vernacular Tamil—a hybrid of Tamil and English—is "doctor." Shekhar turns to me and nods with vigor and triumph; with good reason, as against all seeming odds, he's successfully brought me to my destination. Although, I fret, this so-called "clinic"

looks much more like a house. Then I see the small, thatched-roof annex tucked alongside the house, bearing a hand-painted sign and a red cross inside a circle: "Dr Krishna Raman—Medical Doctor."

I gingerly step down from the car, my relatively pampered muscles bruised from the jarring hour of swerving over Chennai's obstacle paths. Then the reality of the moment floods over me. Here it is: the clinic of Krishna Raman, MBBS, FCCP, graduate of the BKS Iyengar Institute.³⁴

Traveling down the inevitable extended-relative grapevine earlier, news of my medical "rotation" with Dr Raman had sparked much excitement. "Just one look at the frozen shoulder, and he knew exactly what to do: a few medicines, creams, and some yoga postures and I was completely back to normal," my aunt had gushed. My grandmother had solemnly agreed. "Dr Krishna Raman, he's a big name," she said with hushed reverence. "He's been on TV, helped many people ... you're lucky to be able to work with him." Although I have grown accustomed to my relatives' proclivity for exaggeration (eg, "air-conditioned" referring to "extra ceiling fan"), I figured at least some truth inspired this exuberant praise. A perusal of the clinic's Web site and Dr Raman's publications introduced me to his mission of providing quality health care to all patients regardless of socioeconomic status. And his treatment came with an added twist: allopathic medicine supplemented with an emphasis on lifestyle changes, including the incorporation of a personal practice of yoga.

Brushing beads of sweat off my forehead, I leave my slippers outside the door—the custom in Chennai—and step barefoot onto the mosaic-tiled floor of the clinic. The

room is empty, except for the clamoring rattle of a fan, which seems to be producing more noise than breeze. A bare light bulb flickers overhead, casting feeble light over a wooden table placed in the center of the room. Five chairs are neatly lined in a row, empty except for a stack of magazines and newspapers: *Time*. *India Today*. *The Hindu*.

"Welcome!" I am greeted by a trim, elderly gentleman wearing a light green polo shirt and cleanly pressed khaki pants. Dr Raman ushers me inside to give me the one-room clinic tour. It's short: there's the waiting room, which I've already seen, and the combined exam-room/physician's office featuring familiar fixtures of outpatient medicine—a Dell computer station, exam table and the less familiar x-ray viewing box.

Dr Raman shows me the day's schedule, explaining that he routinely sees between 40-50 patients a day. Most come in with a chief complaint of musculoskeletal pain. "There are sometimes significant social issues," he says in lightly accented English. "Some women come with carpal tunnel syndrome from rolling *chapattis* all day for 20 in-laws, for example. It's impractical to tell them to stop cooking, when it's what everyone—including the patient—expects." I nod, wondering how anyone could tolerate standing even slightly near heat-generating kitchen equipment in the searing 100-degree-plus weather, especially in 9 yards of a silk fabric sari. "But I get patients from all backgrounds," he continues, leaning back in his chair as I take a seat in front of the desk. "Muslim, Hindu, Sikh, Christian, Tamil, Hindi, Telugu, Marwari. There are those who can't afford to pay—the care is free for them. Others are successful businessmen and women; they pay the regular

fees." (Regular fees, I find out, are anywhere from 250—800 rupees [INR], \$6-\$12.)

Dr Raman also eagerly expounds on the aspect of yoga and lifestyle education interweaved into his clinic services. "These days, the nine-to-five tech jobs ... so many people are sitting, no such walking or activity as they had in the past. Only a decade ago, people walked more. Activity was built into their lives: walk three miles to school, to go to the temple and to do 40 *pradakshinams*.^a Now it's staring at the computer screen."

"So naturally," he continues, "muscle pain complaints are the biggest part of my practice. Herniated disks, osteoarthritis, carpal tunnel syndrome, chondromalacia. A lot of it, of course, is sedentary lifestyle and being overweight. For these people, I do give allopathic treatment for the pain and swelling. But that cannot change lives. A daily yoga practice, however, can—it improves flexibility, lean muscle mass, peace of mind all in one," he concludes triumphantly.

I had half-expected an introductory discourse on Chennai's clinical epidemiology covering topics such as Pott's spine, leishmaniasis, and leprosy; my mind now shifts gears in the face of a medicine demographic echoing my patient encounters in the US. Dr Raman turns to his computer and, with a few mouse clicks, brings me even closer to home as he pulls up the ubiquitous blue screen of a Microsoft PowerPoint presentation. "Here, you can take a look at some MRIs and x-rays of some of my patients," he explains as we click through slides containing radiologic proof of patients' suffering and photos of patients (without faces blackened out as in my lectures back home) trying out yoga. There are sari-clad women holding onto a

wall and twisting their spine; somewhat pot-bellied men stretching up valiantly to the ceiling; "before" and "after" MRIs that show the progression of a herniated disc back into its rightful place after a year of yoga. I'm impressed.

Dr Raman looks up abruptly at the clock. "Well, it's 8:30. Let's see our patients."

The Rise of Chennai's Medical Tourism Industry

As India tackles basic deficiencies in public health indicators, another phenomenon transpires in parallel: the explosion of an elite private health care sector worth nearly \$15 billion. Catering to the upper-class segments of Indian society with "five-star" hospitals, this emerging industry is responsible for India's "extreme makeover" of health care.³⁵

Each year, over 150,000 patients fly in from around the world to receive comparatively lower-price treatment or escape long waiting lists. Their stories are featured in op-ed pieces and magazines: Bill W from California, denied health insurance because of a high PSA and suspected cancer, paying cash to receive a transurethral resection of the prostate (TURP) in New Delhi's Fortis Hospital for a quarter of the cost back home; Mohammed S from Kuwait, undergoing an eight-hour removal of a glioblastoma in Chennai's MIOT hospital only a few days after receiving his diagnosis at home.^{35,36}

Nearly 50% of patients treated in Chennai travel from outside Tamil Nadu. Chennai's hospitals go to great lengths to attract this lucrative group of patients, offering city tours, swanky hotel rooms for guests, airport pick-up and drop-off, and hours of one-on-one time with staff physicians. All with calculated

reason, for the industry is forecasted to grow at a rate of 13% per year for the next six years, eventually constituting 3% to 5% of the health care delivery market and contributing \$1-\$3 billion additional revenue for tertiary care hospitals.^{10,35,37,38}

The medical tourism industry in India traces its roots to Chennai—specifically, the Apollo Hospitals group, a private entity, which opened its first international branch in 2007. Navigating the traffic-choked streets of Chennai, it is hard to miss the handsome, coffee-colored marble building with its gold-embazoned “Apollo” moniker, towering above the hand-painted shops and stalls. Apollo’s success inspired the creation of private hospitals and “super-specialty” centers in Chennai offering everything from liposuction to laparoscopic, minimally invasive joint replacement. There is the Shankara Netralaya Eye Institute; MV Hospital for Diabetes and Diabetes Research Center; Madras Ear Nose & Throat Research Foundation, Heart Institute and Institute of Cardiovascular Diseases, all of which are privately owned and nationally recognized.³⁹⁻⁴²

These hospitals steered India’s most lucrative health trends, including telemedicine and medical outsourcing, and have received critical acclaim as the home of various medical “firsts” in Asia and India. Examples include the first successful transmyocardial revascularization laser surgery in 1994, the concept of magnetopexy in 1988 and the first successful heart-lung transplant in 1995, to name a few.^{43,44} The effect of modernized medicine is seen even in such seemingly low-tech places such as the Chennai Central railway station, where there is a telemedicine facility complete with EKG machines and virtual consultation stations for those passengers who suddenly feel

a bout of chest pain along the main concourse.⁴⁵

Glamour and wealth in Indian health care transpire primarily in the private sector, which generates over 70% of all health care revenue (or 6% of GDP in 2005). Highlighting the regional dominance of health care by the private sector, the *South Asian Economic Report* notes that “the proportion of private health expenditure to total health expenditure in the [South Asian] region surpasses that of most countries in the world.”^{43,46} Contrast this with the US, where the government’s share of per capita health care spending tops 50%.

The private sector’s starring role in India’s health care stems from the dynamics of supply and demand: Private providers’ domain encompasses services from x-rays and MRIs to treatment of childhood diarrhea and malaria to prescription drugs. In contrast, government spending on health care actually *decreased* over the past decade.^{10,43} Paucity of funding sustains inefficiency in government hospitals, where shortages of drugs, supplies, and personnel persist. One article describes Chennai’s Government General Hospital, which sees 10,000 patients per day, as having a workforce “not even adequate to cater to a fourth of these numbers.”⁴³ Such basic deficiencies prompted an acrid editorial comment in the city’s major newspaper, *The Hindu*: “It is an ironic outcome of neo-liberal economic reforms that in spite of fundamental policy failures in public health, India is increasingly seen as an attractive international health care destination.”³⁸

First Encounter

The couple walking into the room comprises an elderly man and woman who instinctively seem to lean on each other for support.

The woman is slightly heavysset, with salt-and-pepper hair loosely threaded into a braid and secured with jasmine flowers that have begun to brown in the midday heat. She absently pats these flowers as she looks up respectfully at Dr Raman. Her husband, a stocky, dark gentleman wearing a white *dhobi* and a rather ill-fitting button-down shirt, is carrying a bulky briefcase that he sets down before cupping his hands together. “*Vanakkam*, doctor,” he says with genuine reverence and enthusiasm. It is only two words—hello, doctor—but the undertone of hope in his voice is almost palpable.

Because there isn’t an extra chair, I am trying to stand as inconspicuously as possible under the x-ray viewing box. I wonder what patients will think of my rather random presence as they discuss their aches and pains. Would they request that I leave? Demand an introduction? Should I introduce myself—exposing my broken, American-accented Tamil—or wait for Dr Raman to take the lead?

As I find out, introductions are apparently unnecessary. Patients seem to think that as long as Dr Raman accepts my presence, they don’t need to know who I am, or what my qualifications are for listening to their concerns. Indeed, throughout my rotation here only one patient actually looks at me directly and asks, “And so, who exactly are you?” It’s somewhat of a relief in a sense; part of me fears that by opening my mouth and talking too much, my status as foreigner will instantly be revealed. Throughout the rotation, I grow used to my place as a nameless physician-in-training, nodding in sympathy during the discussions of pain and suffering, hanging up x-rays on the lightboard, helping frail

The medical tourism industry in India traces its roots to a Chennai hospital ... which opened its first international branch in 2007.

patients climb down from the table.

Now, Mr Vasu launches into a description of his wife's agonizing back pain. A few sentences in, however, Dr Raman stops him. "She's the one with the pain?" he asks in Tamil. Both nod hesitantly, and Dr Raman motions to the lady. "Then you talk," he says pointedly. Mrs Vasu looks taken aback for a second, reaching up to her jasmine flowers for support. But she begins, after a moment, to describe the dull ache in her lower back that has disturbed her for the past two years, now intensifying to the point where she can no longer sleep. Dr Raman nods in understanding and is already scribbling down something on a prescription pad. "Let's see the x-ray?" he half-asks, half-commands as he signs the pad with a flourish.

Mrs Vasu looks at her husband expectantly; he readily pulls a large manila envelope from his briefcase. Across the front is stamped in faded gray print: "Swaminathan Scans, Ltd." The envelope contains a glossy x-ray of what is apparently Mrs Vasu's spine. As I will discover throughout the month, even the poorest of patients come to clinic with "high-*funda*"^{7b} radiologic images capturing their anatomy. Obtaining a computed tomography scan or x-ray is as easy as going into a neighborhood stall and paying a few dollars, depending on where the scan is obtained. Meanwhile, if a patient is not able to afford these prices, Dr Raman has agreements with specific x-ray and MRI centers that will perform the tests free of cost.

Dr Raman and I look at Mrs Vasu's x-ray. He asks me what I see; I gesture, with weatherman-style vagueness honed during third-year rotations, over an area with joint-space narrowing. He nods thoughtfully, studies the scan for a few more moments and then switches

off the viewing light. "Right," he tells the couple, who seem to be hanging on his every word. "Absolutely nothing to worry about. No TB, no infection. Take these medicines, and I will give you some exercises; it will become all right." He slides over a prescription (for what looks like an NSAID, PPI, and a topical muscle relaxant) as Mr and Mrs Vasu nod vigorously in tandem, relief evident in both their faces.

Dr Raman stands up. "Also, you will need to lose five kilos," he says bluntly. "You're overweight, and your pain will improve if you lose this weight." Mrs Vasu and her husband look genuinely surprised, almost as though the concept of having "too much" weight is foreign. Dr Raman briskly continues as he hands her a card. "My dietician—Jyotsna—she is very good. You can make an appointment with her, and she will give you a diet. Then come and see me day-after-tomorrow. I will show you some yoga exercises to help the pain." She mouths agreement, looking at her husband with a slightly bemused expression.

Side Effects of Modernization: New Challenges to India's Disease Burden

As the lifestyle of material success touches more of India's citizens, so also does the sobering impact of a new set of health conditions. They are a cohort of "lifestyle" diseases: metabolic syndrome, Type II diabetes, coronary artery disease, obesity, and tobacco and alcohol addiction.

In 2004, almost half the disease burden in South Asia consisted of noncommunicable diseases, a 10% increase over the past decade. Over the next decade, these "lifestyle" diseases will comprise an estimated 57% of India's total burden of disease—with heart disease rising as

India's number one killer—whereas infectious diseases' share will sink below 24%.^{10,47,48}

Heart disease already kills 15% of India's population each year, whereas over a third have metabolic syndrome. The Public Health Foundation of India notes: "India tops the world list in terms of the disability burden due to heart and blood vessel disease (more than all industrial countries put together)."⁴⁹ Tobacco use persists as a major killer, responsible for India's world dominance in oral cancer prevalence. And noninsulin-dependent diabetes mellitus (Type II Diabetes) is also a health scourge for Indians: With over 12% of its adult population developing the disease each year, India is the "diabetes capital" of the world, housing more diabetic patients than any other nation.^{10,48-50}

The changing disease demographic is rooted partly in lifestyle transitions—urbanization, sedentary behavior, changing food choices—which escalate classic risk factors causing diabetes and heart disease. Where Indian residents once feared undernutrition, they are now caught in a growing epidemic of over-nourishment: obesity, and its anvil of chronic disease. A large cohort study found nearly half of Chennai's urban population was obese by a standard of BMI > 25; adopting a waist-circumference-based definition (waist size greater than 90 cm) placed even more Chennaites—55% of Chennai females—in this category.⁵¹ Another study identified 16% of urban Indian schoolchildren as overweight, with close to a third demonstrating insulin resistance (a precursor to diabetes).⁵² Misra et al comment that "the rapid nutritional and lifestyle transition in urbanized areas ... are prime reasons for increasing prevalence of obesity and the metabolic syndrome."⁵⁰

More evidence supports a coupling of urbanization and lifestyle disease. In urban Chennai, high socioeconomic status was found to be an independent, statistically significant predictor of being overweight or obese.^{51,52} Lifestyle may also be partly responsible for hypertension in nearly a third of Chennai's urban residents; a Madras Medical Institute cross-sectional study of 2007 Chennai-based volunteers found that higher monthly income correlated positively with blood pressure. In this study, belonging to a middle-class classification or higher increased the chance of having high blood pressure by 150%.^{50,52-54}

Hastened by obesity and metabolic syndrome, diabetes is a particularly problematic component of the "lifestyle epidemic" in urban India. A large cohort study from Chennai's MV Diabetes Center (Chennai Urban and Rural Epidemiologic Study, CURES) found that diabetes prevalence in urban Chennai increased by 72.3% from 1989 to 2004.⁵⁵ Although this increase arises partly from improved methods of detection and earlier diagnosis, lifestyle factors are also contributors. The Diabetes Prevention Program underscored the role of obesity, lack of physical activity, and poor diet in exacerbating cardiovascular disease and diabetes. Various epidemiologic studies even quantify this effect, suggesting obesity is responsible for up to 90% of the risk of acquiring type 2 diabetes.⁵⁶ As the incidence of obesity and impaired glucose tolerance rises in a younger Indian population, the number of Indian diabetic patients inevitably increases.

Urbanization has clearly transformed India's health, but new evidence suggests genes may also contribute to Indians' growing burden of chronic disease. Of note,

India has a higher prevalence of diabetes and cardiovascular disease than other Asian industrializing nations. Factors hastening cardiovascular disease—high cholesterol, cell markers of inflammation, obesity and overweight, endothelial dysfunction (disruption in the lining of blood vessels leading to formation of artery-clogging plaques), thrombosis (clots which can block blood flow, leading to heart attacks), glucose intolerance (a precursor to diabetes)—affect a greater proportion of South Asians than Caucasians, with onset in Indians occurring 10 to 15 years earlier. Nearly half of all cases of heart disease are detected in Indians younger than age 50—and over half of all cardiovascular deaths occur in people <70 years in India, compared with 22% in developed countries.^{50,55,57,58}

Several studies extricate the genetic component to lifestyle diseases in India. One study by the International Diabetes Epidemiology Group showed that Indians' risk of acquiring diabetes increased at lower levels of body mass index (BMI) compared with Europeans—and is more sensitive to smaller increases in BMI.⁵⁹ The National Urban Indian Survey found central obesity had a higher prevalence (50%) among Indians; even lean-BMI individuals tended to have central obesity and high percentages of body fat. This is particularly significant as central adiposity—the so-called "apple shape"—carries the strongest relationship to impaired glucose tolerance in Indians.^{50,55,57,58,60,61} In fact, the "unique" Indian overweight and obesity patterns prompted the Association of Physicians of India to issue revised 2009 guidelines for obesity and metabolic syndrome, aimed at identifying more at-risk Indians and staving off disease through early prevention strate-

gies.⁶² In sum, such research supports a theory that Indians may have inherent genetic susceptibility to diabetes and cardiovascular disease, now unmasked by lifestyle changes accompanying India's urbanization and industrialization.

Co-pay

As the Vasus stand to leave, Mr Vasu asks, "*Evlovu*, Doctor?" [How much, Doctor?] Dr Raman waves them off. "You can pay me later; it will be 500 rupees." Mr Vasu cups his hand once more in respect, and the couple exits the room. I am struck by this trust-based system of accounting—when exactly is "later"?—as I begin straightening the room for our next patient.

Paying for India's Modernizing Health Care

Most citizens pay out of pocket for health care (40% of the \$27 per capita health spending in 2002). Talking to various patients during my rotation, I gleaned that a typical middle-class Chennai household (mean income INR 10,000) generally finds outpatient medical care at a government hospital to be affordable: A clinic visit costs anywhere from \$.50 to \$5; a knee x-ray can be obtained for \$4; a week's supply of antibiotics will run less than \$3.⁶³

Unfortunately, current trends in health and social demographics are already driving up prices, threatening to render an era of affordable health care obsolete. First, as private tertiary care hospitals flourish in the wake of the medical tourism goldmine, state-of-the-art procedures and facilities demand increasingly prohibitive prices. Second, as the prevalence of "lifestyle" diseases increase, so also does the cost of receiving treatment. In contrast to times when disease treatment entailed an empiric course of relatively

cheap chloramphenicol, today's urban diseases demand expensive antidotes—cardiac catheterizations and stents, a multidrug regimen of blood pressure- and cholesterol-lowering medications, coronary bypass procedures, and total knee replacements.

Thus, staying healthy is getting expensive in urban India. A five-year cohort study of 556 diabetic patients found that total household expenditures on health care—constituting 34% of median annual income—increased 113% during a five-year period, with the *highest* increase in percentage outlay occurring in the lowest socioeconomic group.⁶⁴ Another study found that 50% of patients hospitalized in 2004 faced hospital expenditures exceeding 10% of annual household spending.⁶⁴ Reaching deeper into their pockets to receive medical care, India's citizens often must sell their assets or borrow to meet costs—as was the case for 40% of Tamil Nadu's inpatients in 2007.¹⁰

Debriefing

When Dr Raman and I sit down later to debrief, I ask him if he thinks his patients will take the medications he prescribes, make the appointments he recommends or follow-up on his instructions. “Oh, they do,” he tells me matter-of-factly. “It is a different doctor-patient relationship. Patients here take these appointments very seriously. It is almost never the case that a patient will not schedule a follow-up appointment or fail to obtain the scans needed or ignore the prescriptions. They want to get better, of course, and they believe that will come from listening to the doctor.”

I think back to my small repertoire of patients encounters as a medical student in Michigan: the hour spent answering the questions

of a pneumonia-ridden businessman who is concerned about taking a new antibiotic, explaining to an irate sickle-cell patient the rationale for capping her morphine dosage, reiterating to a frustrated patient that her work-up to date has not yet revealed a specific etiology to “fix.” As I will find throughout the month, it *is* a different world here. Dr Raman does very little explaining; the patients, in turn, question and challenge very little. They accept the added medications, the reassurance that “it will become all right,” the exhortation to “get an MRI scan and follow-up in a week,” almost as if it is a duty. The inherent trust they place in Dr Raman's opinion is, perhaps, reflective of the prevailing cultural attitudes toward physicians. As a patient stated: “For the majority of us, a doctor is virtually God—one who is beyond questions or doubts and has solutions to all our ills.”

Reflections: The Future of Indian Health Care

The opulent luxury of private-sector hospitals, juxtaposed with creeping improvement in basic health indicators, hints at the dichotomy of health care in India. Even as efforts abound to quash pathogens and parasites—the vestiges of underdevelopment and poverty—India's private health care industry flourishes, bringing with it the promise of profits. This twin agenda operates at polar opposites of socioeconomic class, two seemingly disparate foci running in parallel. Is it sustainable—and equitable? The Asian Development Bank's South Asian Economic Report warns, “Although medical outsourcing will give impetus to economic growth in the region, it could also distort the availability of medical care away from South Asia's poor as the health systems cater to

clients from the developed world.”¹⁰ Growing evidence supports the troubling emergence of a two-tier system, whereby quality health care caters to and becomes the de facto privilege of the upper class, and the average citizen depends on underfunded, understaffed public facilities. This, in turn, portends a spiral of suboptimal health for the nation's poor and middle class, carrying somber ramifications for goals of public welfare and social equality.

The dramatic changes in India's health environment and shift of the disease profile presage an economic and social transformation in health care delivery. On the one hand, the nation's newfound riches promote certain types of health, effacing the disease-ridden India stereotypes of middle-school geography books and quaint Rudyard Kipling tales—where epidemics of cholera and polio consumed millions and curable infectious diseases terrorized the lives of city inhabitants. But even as strides are made in the realm of hygiene and hospital infrastructure, new health challenges emerge in the shifting face of disease, cost containment, and health care access. Such challenges carry relevance to health care in the developing world, as they represent the prototypical public health needs of a nation straddling the realities of persistent poverty and the heady success of breakneck growth.

Reflections: The Beginning of a Journey

I am waiting for takeoff. It is pitch black outside—approximately 1:30 am, Indian Standard Time—and my head is heavy with fatigue. The dry Lufthansa cabin air keeps forcing me to sneeze, thwarting half-hearted attempts at sleep. My mind also appears to be part of the plot

Here lies a crucial area for future medical service in Chennai: public health education, enabling its citizens to understand—and practice—the elements of a fundamentally long and healthy life.

to keep me awake, buzzing with a flurry of thoughts and impressions of a summer in India.

I revisit the trepidation that pervaded my first bumpy car ride to Dr Raman's clinic. I had imagined—and feared—the rapidly urbanizing,

technology-championing, café-laden “new” Chennai would serve as a rude shock, alien from the “Madras” of childhood visits. I had wondered if any trace of my heritage—the culture that sparked my passion for art, music, and dance—might remain in this revamped, modernizing pantheon of software outsourcing. And, with quavering hope and resolve, I had entered this city with the goal of

serving in a medical capacity, of understanding the city's unique health needs.

Chennai had changed. There were glitzy new stores, air-conditioned restaurants, new highways, the flood of bright matchbox Fords and Hondas. There existed a growing sense of empowerment: young professional women confidently rode to work on scooters and mopeds in the midst of rush-hour traffic; billboards heralded the grand opening of new technology parks; newly installed garbage cans on street corners exhorted in Tamil: “Don't Litter: Keep Chennai Beautiful.” And, of course, there were momentous changes in health care. Multistorey hospitals towered over dilapidated clinics; clean public restroom facilities emerged as reliable fixtures in malls and restaurants. Complex surgeries no longer necessitated expensive trips abroad; instead, medical tourism now brought thousands of foreigners and a steady stream of profits

to Chennai's hospitals each year.

And yet, in Chennai much remains the same. The ancient temples I had visited on trips past are still as ancient as ever. The homemade *palgova* and cardamom milk from my favorite (non-air-conditioned) dairy store still tastes as divine as I remembered it, and unfortunately is still as fattening. Cows still lazily ruminate as they always have on pot-holed side roads, unperturbed as surrounding cars unleash a blaring cacophony of honks. The unique aroma of incense, spices, humidity, car exhaust, roasted peanuts, and coffee powder still hangs in the air—it's simply mixed with more exhaust fumes.

Chennai's health also sadly carries echoes of the past. Beggars still cry for food on street corners; slums still spill human filth and suffering. Public health initiatives have mitigated—but not eliminated—once epidemic communicable diseases. India still carries the world's greatest burden of patients with tuberculosis, and must face the challenge of emerging multidrug-resistant strains. Polio and measles may no longer consume lives in Chennai, but HIV/AIDS and malaria persist as important health concerns; infectious diarrhea still kills an unacceptable number of children each year. The battle to provide fundamental public health needs is still not won, and it must not be ignored in favor of the *haute* trend of elite health care.

India's paradox of constancy and change—epitomized by its health care—serves as Chennai's major theme. As a student in Dr Raman's clinic, I interacted with a truly diverse socioeconomic, cultural, and religious cross-section of Chennai society, many of whom were crippled by pain exacerbated by a sedentary lifestyle, excess weight, and poor dietary habits.

Often, patients had no idea that they were overweight—or that lifestyle could potentially undermine their health. Several patients were unfamiliar with the concept of a “heart-healthy” diet, or unaware that they could modify their risk for diabetes and heart attacks with simple dietary and activity modifications. Here lies a crucial area for future medical service in Chennai: public health education, enabling its citizens to understand—and practice—the elements of a fundamentally long and healthy life.

The plane revs up its engines in preparation for the final rapid acceleration before takeoff. As we rise smoothly above the twinkling lights of Chennai, I peer out the window, straining for a final view of the city and its roads (which are, even at this hour, packed with cars), exhaling a wave of nostalgia as the city lights fade, covered by growing patches of clouds and mist. I press my face against the cool window, imagining I can still see a twinkling light or two.

As the last visible light disappears from view, I realize it is only a matter of time before I return. For the past month has introduced me to a challenge—a medical need that speaks to my interests in public health, service, and culture—that I am determined to revisit and tackle as a physician.

Even with all its chaos and inefficiency, Chennai somehow, miraculously, inexplicably, stubbornly, still works. It's reassuring, for I know it will still be working when I fly back at some point in the future into the humid air surrounding Anna International Airport.

I wave goodbye one last time before pulling the window cover shut. “*Paarkalam*,” I whisper, to no-one in particular. It's a promise: See you soon. ❖

- ^a *Pradakshinam*: walking around the temple in a sign of respect—40 *pradakshinams*, depending on the size of the temple, can equal several miles!
- ^b *High-funda*: a slang term used to capture the idea of “high-tech,” “new-age,” or “chic”—as in: “That’s one high-funda Lexus IS Coupe you’re driving!”

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Dreams of Living Men

If there is one place on the face of earth where
all the dreams of living men have found a home
from the very earliest days when man began
the dream of existence, it is India.

— *Romain Rolland, 1866-1944, French writer and art historian,
winner of the 1915 Nobel Prize for Literature*