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India's Diabetes Epidemic Cuts Down Millions Who Escape Poverty
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By Jason Gale

Nov. 8 (Bloomberg) -- Kalpana Sonar, a petite 40-year-old mother of two teenage boys, recalls with a grimace how tingling in her hands and feet began keeping her awake nights in her suburban Mumbai high-rise.

Sonar, who had moved to the four-room apartment six years ago from the city's Cuffe Parade slum and, before that, a mud hut in the village of Matari, was treated for high blood pressure and dizziness last October.

When her legs started aching and grew numb, her doctor gave her grimmer news: After escaping from childhood hunger and deprivation and joining India's booming middle class, Sonar was suffering from diabetes -- a disease normally tied to a lifetime of inactivity and overeating, Bloomberg Markets magazine reports in its December issue.

"Diabetes, the weight gain, these things shouldn't have happened," Sonar says, dressed in a pink-and-white sari that reveals the small paunch on her 55-kilogram (121-pound) frame -- a normal weight for her 1.5-meter (5 foot) height. "Now the illness is here, it isn't going away."

Sonar, a homemaker, says questions swirl through her head: how long will she live, who will take care of the family, and will the boys -- who enjoy soda and computer games -- wind up with diabetes too? Sonar's 60-year-old brother and 50- and 55- year-old sisters also suffer from the condition.

"Your mind starts coming up with all these things," she says in the living room that she and her husband Prakash Sonar furnished with a television for their sons. "If something happened to me, what would happen to everybody?"

Diabetes Epicenter

More than 50 million Indians are struggling with the same frightening predicament. The International Diabetes Federation in October 2009 ranked India as the country with the most diabetics worldwide. The umbrella group of more than 200 national associations estimates that the disease will kill about 1 million Indians this year, more than in any other country.

With 7.1 percent of adults afflicted, India is on a par with developed countries such as Australia, where 7.2 percent of adults suffer. India now fares worse than the U.K., where 4.9 percent are diabetic. In the U.S., where more than two-thirds of adults are overweight or obese, 12.3 percent have diabetes.

Doctors say a perverse twist of science makes Indians susceptible to diabetes and complications such as heart disease and stroke as soon as their living conditions improve. As a decade of 7 percent average annual growth lifts 400 million people into the middle class, bodies primed over generations for poverty, malnutrition and manual labor are

leaving Indians ill- prepared for calorie-loaded food or the cars, TVs and computers that sap physical activity.

Programmed for Diabetes

Researchers are finding the pattern begins before birth: Underfed mothers produce small, undernourished babies with metabolisms equipped for deprivation and unable to cope with plenty. Sonar's mother, a widow who spent her life in a village and raised seven children by doing farm work, was active and healthy into her 70s, Sonar says.

"Diabetes trends in this country are absolutely frightening," says Nikhil Tandon, a professor of endocrinology at New Delhi's All India Institute of Medical Sciences, which India Today magazine ranks as the nation's top medical school.

In urban India, Type 2 diabetes, the kind Sonar has, affected 3 percent to 4 percent of adults when Tandon, 46, graduated in the mid-1980s.

"Now, it's 11 or 12 percent," he says. "In some parts of southern India, it's 18 or 19 percent. Nobody predicted it. That is huge."

Younger Victims

About 90 percent of diabetics worldwide have the Type 2 variety, in which the hormone insulin is unable to regulate sugar in the blood. Type 1, once known as insulin-dependent or childhood-onset diabetes, is caused by the body's failure to produce enough insulin.

Diabetes is hitting India's population at an average age of 42.5 years -- about a decade earlier than it strikes people of European origin, says Anoop Misra, head of diabetes and metabolic diseases at Fortis Healthcare Ltd.'s hospitals unit in New Delhi. That's hobbling a population of money-earners and parents during their primes.

Diabetes costs India the equivalent of 2.1 percent of its annual gross domestic product, the Economist Intelligence Unit found in 2007, mostly from lost earnings and productivity. Costs in the U.S. were 1.2 percent of GDP and 0.4 percent in the U.K. in the same year.

Big as Global Warming

Diabetes and its complications are striking just as India has gone on a tear. The world's second-most-populous nation has placed behind China as the fastest-growing major economy for most of the past decade. India is a member of the BRIC group of rapidly emerging markets, which includes Brazil, Russia and China. Those countries have become symbols of the shift in economic power toward the developing world.

Now, chronic diseases are threatening that growth. In China, where the diabetes federation estimated last year that there would be 43.2 million diabetics in 2010, a March study reported the number as 92.4 million. India's tally may skyrocket next year, when that country reports its first national survey in a decade.

"If you think of countries like India, where they can't afford to vaccinate every child, how on earth will they cope with the epidemic of non-communicable disease?" says Mark Hanson, 61, chairman of the International Society for Developmental Origins of Health and Disease. "It is at least as big a threat as global warming. It's going to absolutely ruin the economy of the world in the next 20 to 30 years."

Poverty Trap

The diabetes scourge is knocking down Indians just as they enjoy the jobs and education that have raised millions out of poverty. Since 1991, when Prime Minister P.V. Narasimha Rao opened India's economy, inflows of foreign direct investment have swelled to \$34.6 billion last year from \$75 million. Per-capita income has more than tripled to \$1,180 from \$350, adult literacy has improved to 66 percent of the population from 48 percent and infant mortality has declined 37 percent to 52 deaths per 1,000 live births.

Now India is adding afflictions most often seen in developed countries.

"Non-communicable diseases are no longer diseases of the rich, diseases of affluence," Margaret Chan, 63, the World Health Organization's director-general, says in a phone interview from its Geneva headquarters. "People in Asia are developing diabetes in larger numbers and at a younger age than in Europe and North America, and they are dying sooner. If, in the process of economic development, you are getting trade-offs

-- a lot of diseases -- what is the net effect?"

'Knock Down Generations'

Diabetics worldwide will soar to 438 million in two decades from 285 million today, the diabetes federation predicts. By then, more than three-quarters will be in low-and middle-income countries.

"If the world doesn't wake up, this thing will knock down generations," says David Barker, a British doctor whose research has helped explain the origins of so-called lifestyle ailments and why they're exploding in India and China.

India's medical system is sagging under the pressure. The country, still grappling with malaria, polio and leprosy -- diseases that have been eradicated in developed countries -- is fighting a wave of diabetes-related ailments. Doctors are battling kidney failure, vision-impairing retina damage and foot ulcers that require at least 200,000 amputations a year, a fifth of the global total. Diabetes also raises heart attack and stroke risk at an early age, as fatty deposits caused by high blood sugar clog arteries.

'Health Catastrophe'

"Young people who are the drivers of the economy, who are the protectors of their family, are going to be lost," says cardiologist Prathap Reddy, 77, who in 1983 founded Apollo Hospitals Enterprise Ltd., India's biggest private hospital chain. "It is not just a health warning; it's a major health catastrophe that's facing Indians."

Diabetes, stroke and other non-communicable diseases deprive India of more than \$23 billion a year in income. The \$1.3 trillion economy would be 4 percent to 10 percent greater if those diseases were eliminated, the World Bank concluded in January. Such ailments undermine efforts to increase India's life expectancy beyond 64, which is a decade below China's.

Sonar recalls her early years as she rifles through a shopping bag brimming with six months of recent medical records.

As a child growing up in a village near the Arabian Sea, at least once a week she plodded for two hours along a dirt path to collect water for

her eight-member family, which existed on two meals a day of vegetables and rice.

'You're So Skinny'

Walking and meager food kept her weight below 35 kilograms as a teenager, about the same as an American fifth-grade girl. Once she moved to Mumbai, where water flowed from a tap and food was more plentiful, she began to gain weight.

"People would always say to me, 'You're so skinny. You can afford to get a little fatter,'" she says.

Viswanathan Mohan, who has treated diabetes patients in the southeastern city of Chennai for more than 30 years, has heard such stories before. These days, he diagnoses about one teenager a week with Type 2 diabetes. He predicts that a quarter of adults in urban India will have the disease in a decade.

"In the West, they seem to report only a few cases with Type 2 diabetes in children," he says. "We're talking of hundreds of cases here." Two-and-a-half percent of his new patients are under 25, Mohan, 56, says. That compares with fewer than 0.5 percent in 1991.

Amputations

Vivekanand, a vascular surgeon in India's technology hub of Bangalore, sees the grim outcomes. The doctor, who goes by one name, and his colleagues at Bhagawan Mahaveer Jain Hospital, operate on about 80 lower limbs a month to repair veins damaged by diabetes and smoking. Without adequate blood flow, foot wounds can become septic.

His hospital amputates about five legs every month because of diabetic complications. At least three times as many patients lose toes and part of their feet, he says.

"When infection becomes so severe that it will kill him if I don't cut his leg off, that's when we do it," Vivekanand, 41, says. "Life is more important than a limb. But in India, a limb is especially important because without a limb, he loses his livelihood and becomes dependent on somebody. That robs him of his dignity."

The crush of diabetes is a daily routine at Mumbai's Sir J. J. Hospital, 30 kilometers (19 miles) from Sonar's apartment. One April morning, about 100 people file through its state-run clinic. Many wait hours on wooden benches for a free insulin shot because they can't afford the 400 rupee to 500 rupee (\$9 to \$11) weekly cost of the hormone, says Priya Patil, who has been a doctor at the 165-year-old hospital for 10 years.

'Day in, Day Out'

"Diabetes and hypertension, they are saying it's an epidemic in India," Patil says. "We are seeing it day in, day out."

A trained doctor and third-year medical students had been running the second-floor clinic, which is reached by a rickety elevator with a concertina-style grille door. Now it's managed by second- and third-year students, Patil says.

Government hospitals such as Patil's treat patients either free of charge or at subsidized rates, a system that stretches resources and forces patients who can afford it to visit private practices.

Health Worker Shortage

India has the greatest need for health workers globally, with an estimated 515,000-person shortage, aid group Save the Children said in May. Worse for the afflicted, only 5 percent of Indians are covered by health insurance; 66 percent of total health expenditure is paid out of pocket. This expense amounted to almost 846 billion rupees in 2004, a sum that can discourage treatment or impoverish those footing hospital bills.

"The health system is at the moment inadequate to deal with the situation," says Fortis's Misra, 52, who was a personal physician to Prime Minister Rao and his successor, Atal Bihari Vajpayee.

Prime Minister Manmohan Singh, who underwent coronary artery bypass surgery in January 2009, says India requires urgent public health measures. The government set aside 16.6 billion rupees to prevent and control diabetes, cardiovascular disease and stroke from 2007 to 2012. It pledged to boost public health expenditures to 3 percent of GDP by 2012 from 0.9 percent.

Government efforts are zeroing in on maternal and child health. Doctors are just beginning to unravel a mysterious evolutionary sequence to understand why Sonar and millions of middle-aged, upwardly mobile Indians are succumbing to diabetes.

'Bankrupt Health Systems'

"Most governments haven't realized that this is such a big epidemic and can bankrupt health systems," says Paul Zimmet, a Melbourne-based doctor who brought to light diabetes rates in Indian and Pacific Ocean populations. "Unless we intervene at the maternal and fetal level, it's going to be 30 years before anything turns around."

Halfway around the world, Barker, the British physician studying lifestyle diseases, reported findings two decades ago that are helping scientists understand India's diabetes surge.

At the University of Southampton, 80 miles southwest of London, Barker discovered that areas of Britain in which coronary heart disease was most common had had the highest infant mortality 60 years earlier.

Studying the medical records of about 15,000 people born from 1911 to 1940, he found those who were small as infants were more likely to get heart disease, diabetes and stroke as adults.

The link sparked Barker's hypothesis that diabetics such as Sonar could trace their disease to how they adapted to malnutrition in the womb.

Survival Trick

"The conventional explanation up until that time was that poorer people have worse lifestyles and so they are kind of bringing it all on themselves," Barker, 72, says. "That would be the prevailing view in the U.S. today. There isn't evidence for that."

As Barker sees it, malnutrition during a baby's development affects how a person's body behaves for a lifetime. An undernourished fetus prioritizes sugar for its growing brain. To make more glucose available in the blood, the fetus stores less of the energy in its muscles by making the muscles resistant to the effects of insulin.

What starts as a clever survival trick in the womb becomes a liability in later life. When food is freely available but the muscles can't store excess glucose, the blood floods with sugar and diabetes develops. Too much sugar in the blood damages the heart, small blood

vessels and nerves, compounding the risk of heart attack, stroke and kidney failure.

'Our Lives Were Rotten'

"The biggest recipe for chronic disease is to have a very poor start in life and then to be in a situation where you're rapidly transitioning towards excess nutrition and inadequate activity," says Caroline Fall, 56, a professor of international pediatric epidemiology at Southampton, who joined Barker's group in 1990 and has studied diseases in India since 1991. "That's absolutely characteristic of what's happening in India."

Conditions for a cycle of deprivation and diabetes are ripe in India, where people start out more malnourished than in almost all other countries. Twenty-eight percent of Indian newborns -- or 7.4 million in 2008 -- weighed less than 2.5 kilograms; 43 percent of children under 5 years are underweight, the United Nations Children's Fund said in November 2009.

Sonar recalls that growing up in a single-room hut, she would sometimes go to bed hungry. Her father, who eked out a living as a tailor, died when she was 10, forcing her mother to work in the fields. The family ate mostly cauliflower, okra, spinach, lentils, rice and chapatis, bread made from whole-wheat flour.

"Our lives were rotten," Sonar says. "My father was dead, and we had no money."

Fried Papadums

She moved to Mumbai in 1991 to marry Prakash Sonar, a wedding photographer. They lived in a 4-meter-by-5-meter (13-foot-by-16-foot) second-story shanty on Cuffe Parade, a teeming slum of thousands of dwellings on Mumbai's southern tip.

Income rapidly improved when Prakash began a job constructing party and event venues. They added ice cream, chicken and mutton to their vegetarian diet. Kalpana Sonar developed a taste for crispy fried papadums; pickles preserved in oil; and gulab jamun, deep-fried dumplings in sugar syrup.

After the births of her sons, and as she ate more, she gradually gained weight. By the time the family bought their apartment in the Mumbai suburbs, Kalpana Sonar weighed 45 kilograms. Her body mass index was 19.5, within the WHO's normal range for a woman of her height. She got a washing machine, air conditioning, her own toilet and a maid. Over six years, she gained 12 kilograms.

Nerve Damage

By the time she was prescribed Daonil to control blood glucose, her nerves were irrevocably damaged. Before she began walking with two diabetic friends and shed 2 kilograms, she weighed 57 kilograms -- still normal, according to WHO.

"Although Indian people who get diabetes are slim by Western standards, they have got pound for pound more fat," Barker says. Indians have less lean mass as a percentage of total weight, contributing to their diabetes risk, he says.

Chittaranjan S. Yajnik says Barker's research resonated in India, where diabetes patients were younger and weighed less than those he'd

seen during post-graduate training at England's Radcliffe Infirmary in Oxford, which closed in 2007.

"As a medical student, it was very obvious that while we were reading Western textbooks, what we were seeing in our patients was very different," says Yajnik, 58, director of the diabetes unit at King Edward Memorial Hospital in Pune in western India. "We needed to study Indians."

Chronically Hungry

Yajnik observed that Indian newborns were typically small and thin -- like their mothers -- yet carried proportionally more insulin-repelling fat than infants in England. More important, he found low birth weight predicted insulin resistance in Indian children, identifying those already on the road to diabetes and cardiovascular disease, just as Barker had posited.

Yajnik says India's diabetes threat will accelerate because malnutrition lingers even as affluence improves food, plumbing and transportation. Asia's third-biggest economy will have a 583 million-strong middle class by 2025, McKinsey & Co. predicted in 2007. Still, the ranks of India's chronically hungry swelled by 75 million to reach 237.7 million in the decade through 2007, the UN found. China's undernourished people dropped by 11.4 million to 130.4 million during that time.

Studies on birth weight are pointing to ways India may slow the epidemic. Zimmet, 68, says research is forcing scientists to change conceptions about what causes Type 2 diabetes.

'Fetal Origins'

"We were always beating the drum that it was sedentary lifestyle and bad diet," says Zimmet, who heads a WHO center for diabetes epidemiology. "Now we are accepting the fetal origins story."

Governments aren't inclined to promote maternal nutrition as a key diabetes prevention strategy without more scientific proof, and that may take decades, he says.

Fall and colleagues in Southampton are trying to speed things up. Four years ago, they began enrolling 5,000 women in a north Mumbai slum to test better maternal nutrition starting months before conception. Researchers are studying what happens when women eat a daily snack containing green vegetables, fruit and milk that's high in folic acid and vitamins before and during their pregnancies. Their babies will be measured, and their risks for disease recorded.

Less Sugar

The research won't help Sonar's generation. Instead, she's attempting -- and often failing -- to follow standard diabetes treatments: medication, diet and exercise.

"I have been trying to eat less sugar and fatty food, but with the festivals, it's been hard," says Sonar, who put on 3 kilograms after hiring a maid in July and during Ganesh Chaturthi, a Hindu festive period in September. She spends 500 rupees a month on pills that are mostly for diabetes and hypertension, along with Ambulax, an anti-anxiety tablet.

Sonar, who doesn't know how heavy she was at birth, says her sons weighed about 2.5 kilograms, heightening their risk for diabetes as

adults. Both boys are slim. Yet they're fond of sugary drinks and less active than she was at their age. Akshay, 16, hurries home from tutoring to watch a TV comedy. He and Prateesh, 17, spend three to four hours a day on computer games.

That is a long way from the subsistence existence of Sonar's youth.

"This is a better place," she says. "There's running water in our home. It's better for the children."

Like millions of Indians, Sonar has risen from poverty to attain a comfortable life as part of an economic advance that has captured the world's attention. Along with this progress, though, has come a disease that normally afflicts far wealthier populations. And it has come sooner, in larger numbers, and with more profound consequences than anyone foresaw.

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