

Dying Kids, a Poor Indian Village, Uranium and a Mystery

By Rakteem Katakey
Rajesh Kumar Singh
Tom Lasseter
Bloomberg News

July 9, 2014 – On a sun-seared afternoon, Sanjay Gope crawls across a dusty courtyard of the low-slung, mud-walled house he shares with 10 members of his family. Stacks of cow dung dry in the heat and chickens rest in the shade.

His grandfather, Debnandan Gope, watches glumly as the boy struggles, face streaked with sweat, one thin forearm, then another, digging into the dirt, his legs and feet carving a winding trail behind him.

About 10 years old – ages in India's villages are often estimates – Sanjay could move normally as a toddler until seizures began to wring the life from his arms and legs. Now, when no family member can assist him, he's left "to crawl around the ground like a snake," his grandfather said.

That would be dispiriting enough save for the omen it conjures. An older sister, Sunita, experienced a similar collapse. Her limbs grew so deformed that she couldn't feed or bathe herself before she died two years ago at 13.

Across the path that runs by Sanjay's house, Rakesh Gope, a member of Sanjay's tribe although no direct relation, sits on a dirt floor under the rusting corrugated roof of an open-air



Once ringed by lush tribal forests, the village of Jadugora is today a troubling portrait of modern India, its outskirts a postcard of pastel-painted mud houses scattered amid tidy rice fields, its center the hub of India's uranium mining industry that is fueling an unprecedented nuclear power boom. For years, desperately poor people living in scattered villages in the shadow of these mines have been tormented by a mystery: What's causing the wasting diseases that are deforming and killing so many of their children?

room where his grandfather is sleeping. A slight boy with light brown eyes, he attempts to wave but his hands only flap in a spastic flurry. He's another 10-year-old unable to walk on his own.

No one knows exactly how many children like this live here and in nearby villages – only that they are all too easy to find.

Troubling Portrait

Sanjay and Rakesh live near Jadugora, a town of 19,500 people about 850 road miles (1,370 kilometers) from New Delhi in east India's Jharkhand state. Once ringed by lush tribal



Ten-year-old Sanjay Gope of Bango village near Jadugora moved normally as a toddler until seizures began to wring the life from his arms and legs. When there is no family member around to assist him in walking, he is "forced to crawl around the ground like a snake," according to his grandfather.

forests, Jadugora is today a troubling portrait of modern India, its outskirts a postcard of pastel-painted mud houses scattered amid tidy rice fields, its center the hub of India's uranium mining industry that is fueling an unprecedented nuclear power boom.

It's here that state-run Uranium Corp. of India Ltd. is licensed by the Indian government to gouge hundreds of thousands of tons of uranium ore out of the ground each year, while just over a hill, an easy walk from the village, 193 acres of ponds holding mildly radioactive waste stand largely unguarded save for no-trespassing signs.

Mystery Disease

For years, these desperately poor people living in scattered villages in the shadow of these mines have been tormented by a mystery: What's causing the wasting diseases that are deforming and killing so many of their children?

Sanjay's 70-year-old grandfather, a bare-chested, barefoot man rendered lean by hard work and a sparse diet, offers an observation shared by many here – that before the mines

came, children did not crawl around in the dirt and die. He might be dismissed as an illiterate, grieving relative of a crippled boy and a dead girl except that outsiders, including the Jharkhand High Court and environmental activist groups, suggest he may be right.

In February, the High Court in the state capital of Ranchi filed a petition that pointed to the mines operated by Uranium Corp. since 1967. Shocked by photographs of the area's sick and deformed children in the Indian press, the court ordered the company and relevant government agencies to explain what measures they were taking to protect the health of those living in villages around the mines.

'Health Problems'

"The health problems related to uranium mining are affecting the indigenous people disproportionately in and around the uranium mining operational area," with as many as 50,000 people "at risk," the court wrote.

Children living near the mines, the court added, "are born with swollen heads, blood disorders and skeletal distortions. Cancer as a cause of death is more common in villages surrounding uranium operations."

The High Court isn't alone in its concerns. In 2007, an Indian physicians group published survey results showing villagers near the mines reported levels of congenital deformities and deaths from such deformities far higher than those 20 miles away.

In 2008, the Jharkhandi Organization Against Radiation, a local activist group, collected water samples from 10 Jadugora- area locations, including wells and streams. Seven were shown to have

unsafe levels of heavy metals – including lead, a byproduct of uranium mining, and mercury.

Affidavits Filed

Bloomberg News reporters in June took water samples at two sites. Results from an independent testing laboratory found mercury and lead levels within acceptable government guidelines. The lab did find a potentially problematic reading for uranium in water that could make its way into local wells.

In response to the High Court's petition, Uranium Corp. and government agencies in March and April filed 337 pages of affidavits and exhibits, obtained by Bloomberg News and never before made public, amounting to a categorical denial by the company that it bears responsibility for Jadugora-area health issues. A similar query in 2004, one company document said, was dismissed for lack of evidence before India's Supreme Court.

The affidavits also included a document from a provincial regulatory agency detailing Uranium Corp.-backed studies conducted from 2010 to 2012 in 16 villages involving 4,557 examinations of children and adults that produced no cases of congenital malformation. That included three villages near Jadugora where Bloomberg News reporters easily found children and adults with deformities.

'Conventional Health Problems'

"The villagers suffer from conventional health problems, which could be seen in any village with similar socio-economic condition," wrote Mahendra Mahto, secretary of the Jharkhand State Pollution Control Board, pointing to the 2010-2012 survey.

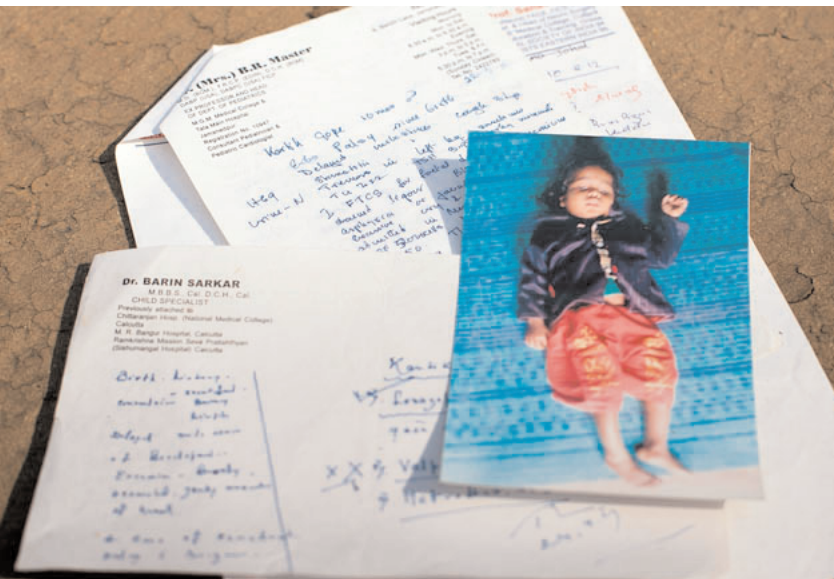


Women wash clothes and bathe near Bango village in Jharkhand state. The nearby River Gara, which receives some water from the tailing ponds, is used by many locals daily to bathe and fish.

The survey wasn't signed by Mahto but by Dr. U.K. Majhee – identified as Uranium Corp.'s chief medical officer at its Jadugora hospital. He declined to be interviewed when approached at his office. Mahto said in a phone interview that he couldn't respond now to questions about the survey because he didn't have the study in front of him. "Unless I see the document, how can I say what I have said and what I have not?" he said.

Diwakar Acharya, Uranium Corp.'s chairman, in a June 25 e-mail to Bloomberg News, repeated the company's position that its "operations in the area do not have any adverse health effects to the surroundings."

Resolving the mystery seems all the more critical considering that some of the water from three Uranium Corp. ponds holding uranium waste known as tailings -- treated, the company says, to remove contaminants – empties into the River Gara, which flows past Jadugora and several other villages and is used daily by locals to fish and bathe.



Kartik Gope's medical records documenting his deformities. No government agency in the locals' memory has conducted the kind of comprehensive study that could get to the bottom of what's sickening and killing the children there.

Tailings Ponds

Just as worrisome are the ponds themselves. They cover an area about the size of 146 football fields and “are exposed and accessible,” said Nitish Priyadarshi, formerly an assistant professor of geology at Ranchi University and member of the Geological Society of India who researches and writes about Jharkhand mining issues. “There’s a lack of awareness among the people in the area. They should probably be moved but it may be too late.”

Acharya, the Uranium Corp. chairman, in the e-mail response said the company has posted proper warning signs and that it can’t be blamed for trespassers. “However, it is to clarify that radiation level in referred area is quite low and short duration exposure has no adverse effect on health,” he wrote.

Others are convinced something is amiss. “Deformities are prevalent in the age group born after mining started there,” said M.V. Ramana, a physicist and India nuclear-energy specialist at Princeton University’s Nuclear Futures Laboratory,

in Princeton, New Jersey, who has written extensively about Jadugora. “It’s not so among older people. That something is affecting them is very clear. It may be radiation, it may be some other heavy metals that contaminate the water. We don’t know for sure.”

Community Meeting

That’s the issue for residents. Neither the company nor any government agency in their memory has conducted the kind of comprehensive study that could get to the bottom of what’s sickening and killing their kids. That would include counting the number of sick and dead and systematically testing for root causes -- assembling genetic and medical histories, collating the results of any previous doctors’ exams and testing for environmental factors like water and soil contamination at their homes and villages.

Debnandan Gope recalled a 2009 community meeting at which villagers broached the health issue with Uranium Corp. officials in attendance. “They gave us one samosa,” bread and vegetables but no answers, he said. “Nothing has happened since. There’s been no help.”

Denials

“Comprehensive and long-term studies” should be carried out, said Ramana, and “at the very least there should be regular monitoring of air and water quality, testing of food and keeping accurate records of diet.”

That this has never been done is unsurprising, he said. “The predominant reaction on the part of the nuclear establishment in India

of ill-health associated with nuclear facilities has been denial or variants thereof.”

Officials at India’s Department of Atomic Energy and the federal Ministry of Health and Family Welfare didn’t respond to e-mails and phone calls seeking comment for this story.

Jadugora’s mines speak to India’s scaled up nuclear power ambitions, even as Japan’s March 2011 Fukushima nuclear meltdown has spurred international debate about the safety of atomic energy programs. Indian officials, facing nationwide power shortages, have said they want to increase nuclear power generation capacity to 62,000 megawatts by 2032. Nuclear energy now provides 1.9 percent of India’s electricity generation capacity.

Fuel Pellets

Uranium Corp., in charge of supplying fuel for that plan, employs about 5,000 people in the mining and processing of uranium, which is the core element in making fuel pellets that fire the reactors in nuclear power plants. Besides its Jadugora- area mines, Uranium Corp. operates the Turamdih mines about 12 miles away, near the city of Jamshedpur, with a metropolitan area population of more than a million people. There have been no comparable reports of illnesses there as in Jadugora and a handful of surrounding villages.

The Turamdih operation began in 2003. New uranium mines are planned in Jharkhand and three other states, according to the Uranium Corp. website.

The Jadugora mines are blocked off by concrete walls and barbed wire. Their gates open for 10-wheel dump trucks, loaded with chunks of



Ten-wheel dump trucks, loaded with chunks of uranium ore, rumble down the road in Jadugora to a central plant. After processing the ore into a powdery compound known as yellowcake, Uranium Corp. transports it to southern India to be made into pellets for atomic power stations.

uranium ore, rumbling down the road to a central plant. After processing the ore into a powdery compound known as yellowcake, Uranium Corp. transports it to southern India to be made into pellets for atomic power stations.

Leftover Tailings

The leftover tailings, in the form of a sand-textured slurry, contain low-levels of long-lasting radiation at about 85 percent of the radioactivity from the original ore. Uranium Corp. said its tailings are treated with lime to remove heavy metals. A 2011 government report sent to the High Court showed that the company's Jadugora processing plant generates an estimated 2,090 tons of mining waste daily, of which 1,000 tons is pumped back underground, leaving about 1,090 tons of treated slurry to be routed every day into its tailing ponds.

Solids settle to the bottom of the ponds, lined with non- permeable material. The



Four-year-old Kartik Gope has weakness in his limbs and can't keep his head from flopping to his shoulders. His mother feeds him in their home in Bango. Local doctors have examined many of these stricken children in local clinics and the results are a mis-mash of conflicting diagnoses, even for siblings with the same symptoms.

remaining water is routed to a treatment plant before being released, some of it making its way into the Gara.

The health danger in all uranium mining, says the U.S. Environmental Protection Agency, is that tailings include radioactive elements like radium that decay into a gas called radon linked to lung cancers.

Primary Threat

The primary health threat to humans occurs when radon gas is inhaled or when radioactive elements from tailings leach into public water supplies. Gamma radiation thrown off by elements in tailings can also “pose a health hazard to people in the vicinity” including genetic mutations that can be “passed on to offspring,” according to the EPA. Uranium Corp. says that its treatment and disposal standards meet all international safety requirements.

Reporters visiting the dump site in April saw workmen at the tailing ponds repairing one of the metal pipes that carry the mildly radioactive slurry, part of a series of winding metal tubes that stand off the ground on small stilts. A guard in a khaki uniform wandered the area carrying a

three-foot wooden stick and absentmindedly waving it in the air.

In the distance, two women in saris strolled up the path leading to the ponds, each carrying a cane basket. No fences block access at the entryway to the ponds area. Locals say they pass in and out of the dump site regularly and it still houses a tribal place of worship.

Water from the pond site flows past a block-lettered sign with the words “PROHIBITED AREA” hand painted in red. It passes by a field used by village children to play soccer, and on to the Gara. Villagers squat at the river's edge to wash clothes, bathe and fish for food.

Poor Community

Jharkhand is a poor place, even by India's standards. Average annual per capita income is equivalent to about \$720 despite the existence of substantial coal and uranium reserves. Debnandan Gope, for example, makes 83 cents a day as a field hand – when he can get work. Illiteracy is common.

People cook on fires fueled by dried cow dung. Women walk the roadsides balancing gleaming metal water jugs on their heads as they go to and from public wells. Village men still plow the land with cattle. Some gather in houses on legs not much more substantial than baseball bats, a result of the meager rice- paste diets common here. Life expectancy is among the lowest in all of India – 58 years compared with 63.5 for the nation as a whole, according to a 2011 United Nations report.

Many scrounge and scavenge to get by – even around uranium dumps. Trespassing signs, assuming they can even be read, don't mean much.

Six Toes

On the sandy banks of the Gara, Chotu Ho pulled plants from its dark, slow moving waters and paused to pluck tiny shrimp and snails off the foliage. A resident of a nearby village, he wore a white sleeveless vest and a lungi, a traditional sarong that was hiked up to his thighs. Both of his feet had six toes.

"I know there's uranium in the water and I may fall ill," said Ho, holding up his catch for inspection under a bright sun. "You can't eat this, but we have to. We're used to it now."

Debnandan Gope, who once manned the slurry pits as a Uranium Corp. contract worker, still goes into the tailing ponds area, as does his wife, to collect firewood. He recalled his work back then. The sludge came by pipe and it was his job to push the stuff into a pit, about 12 feet wide (3.7 meters) by 12 feet long, with a spade. The next day, he would dig a new pit to fill. Sometimes, when he fell behind, Gope just shoveled it in with his hands.

Slurry Pits

The waste was black and smelled burnt, "like fireworks." At the end of the day his arms would be caked with a substance that, when dry, glittered. The extent of safety measures, Gope said, was that a supervisor advised him to wash his hands before eating.

He left when his contract expired and now tends small farm plots for his family and others. While he knows that using wood from a site used to store radioactive waste isn't a good idea, Gope said, "Without the firewood how would we cook?"

As a precaution, Bloomberg News reporters visiting the site and other areas carried a



Kaliburi Gope sits outside her home in Bango village. "Deformities are prevalent in the age group born after mining started there," said M.V. Ramana, a Princeton University physicist and India nuclear-energy specialist.

dosimeter, a hand held device used to measure radiation in the air. It produced a reading in Bango village, about two miles from the tailings ponds and where Sanjay Gope lives, that converts to 7 millisieverts a year. Normal background radiation is about 3.1 millisieverts a year, according to the U.S. Nuclear Regulatory Commission.

Safe Levels

Still, the Bango reading is below levels for which there is evidence of human health effects, according to the United Nations Scientific Committee on the Effects of Atomic Radiation. The impact of long-term exposure to lower doses of radiation isn't well understood.

Uranium Corp. included in its court filings a 2002 study by one of its consultants that showed village area radiation levels at 2.81 millisieverts annually. The company said in its e-mailed statement to Bloomberg that measuring radiation "is a specific skill acquired through

qualification and domain knowledge of the subject” and that a measurement taken with “unknown assumptions is not acceptable.”

The mines, and fears about possible health effects, have sparked only limited protests in the villages. The environmental impact of extractive industries like uranium and coal, twinned with economic straits of locals, have become a rallying cry for Maoist guerrillas in the country’s “Red Corridor,” a stretch of mining states that include Jharkhand. Maoist attacks targeting police and public officials haven’t stopped the mining.

Sick Children

It’s the sick and dying children that have drawn the most concern. During 2007, the Indian Doctors for Peace and Development, an affiliate of Nobel-winning, Massachusetts-based International Physicians for the Prevention of Nuclear War, canvassed 2,118 households in five villages within 1.5 miles of the mines.

The surveys found mothers there reporting congenital deformities more than 80 percent higher than the rates of mothers in villages just 20 miles from the mines. The rate of child deaths reported from such abnormalities was more than five times as high. Uranium Corp. has dismissed the findings as the biased work of “antinuclear groups.”

Still, affidavits filed with the High Court by the government and the company produced a 1998 survey with participation from Uranium Corp. that found unusual “congenital limb anomalies” among area residents – though the report said they weren’t radiation related.

Water Samples

The 2008 water samples collected by the

Jharkhandi Organization Against Radiation were analyzed by the Centre for Science and Environment, a New Delhi-based environmental research and advocacy group that maintains its own laboratory. A notable finding was in a sample from a village tap meant to supply safe drinking water that contained mercury levels 200 percent above allowable Indian government limits at the time, according to laboratory results.

Lead found in a well used for drinking water was more than 600 percent higher than government limits. Uranium Corp.’s chairman said in his e-mail that he wasn’t aware of those tests. Mercury isn’t a byproduct of uranium mining and the Centre didn’t investigate the reason for its presence. The U.S. Geological Survey says mercury is a ubiquitous element found in small quantities in “all rocks, sediments, water, and soils” and in higher concentrations in certain “local mineral occurrences.”

Ingesting lead can cause muscle weakness and brain damage in children, according to the U.S. Agency for Toxic Substances and Disease Registry. Mercury’s harmful effects to human fetuses may include brain damage, mental retardation, lack of coordination and seizures.

Uranium Levels

The water samples gathered at two sites last month by Bloomberg News – at a stream taking runoff from the tailing pond area and a hand-pumped well in Bango village – came back with significantly lower results than the Centre for Science’s lab found. Mercury and lead levels were below levels the government deems a threat to human health.

The results did show uranium levels from the

stream at amounts exceeding World Health Organization drinking water guidelines by 33 percent. Locals don't typically drink from the stream though the water may feed into local wells from which people do drink, according to Souparno Banerjee, the centre's outreach director.

The Bloomberg samples were taken to New Delhi in sealed plastic bottles and analyzed by the Shriram Institute for Industrial Research. The institute is among those approved by the government's Delhi Pollution Control Committee for carrying out such tests.

The High Court petition and the studies by the Indian Doctors group aren't the first time Uranium Corp. has been in the news over radiation pollution. A company statement acknowledged pipelines carrying uranium waste from the Jadugora mines burst in December 2006, spilling radioactive slurry into surrounding fields. The company said the accident was "attended in the shortest possible time."

'Radioactive Waste'

When flash floods hit in June 2008, sending waste cascading into fields, the Hindustan Times quoted a Uranium Corp. spokesman as saying, "the radioactive waste flowing through the village is harmless, as incessant rains have diluted the intensity of radioactivity."

The sick children aren't hard to find. In a mud house painted green, about 100 steps from Sanjay Gope's front door, a four-year-old with telltale weakness in his limbs can't keep his head from flopping to his shoulders. And then there are the deformities.

Next door to Rakesh Gope's house, 14-year-old Parbati Gope, who has a misshapen chest



Pipes like these carry treated, mildly radioactive slurry from Uranium Corp. of India's mining operations to a system of uranium tailing ponds covering 193 acres. The company says it posts proper signs warning locals not to trespass.

and back, stands in a narrow alley as her mother Kuni describes their experience with local health care. "The doctor said 'I don't know what this is, I can't do anything, take her to the hospital.'" Her mother lifted the back of her green tunic to show what looked like a baseball-sized growth underneath her skin.

Forehead Indentation

A few minutes' walk down the road and, behind a courtyard door fashioned by metal cut from mustard-oil tins, Kaliburi Gope, about 20 years old, had similar bulges and an indentation on her forehead. No one can say exactly how many of these cases exist.

Local doctors have examined many of these stricken children in local clinics and the results are a mish-mash of conflicting diagnoses, even for siblings with the same symptoms. Some doctors have blamed polio though the disease appears to have been eradicated, with India's last case reported in 2011.

Others point to cerebral palsy, which is a kind of catch-all diagnosis for a debilitating injury to the brain that could have numerous underlying causes – including mercury or lead poisoning.

Witch Doctor

Sanjay Gope's case shows how desperate parents are for answers. They called a witch doctor to their home. The man sprinkled red powder on the ground and slit the throats of two of the family's chickens, letting the blood splash in the dirt before taking the carcasses for himself. He blamed evil spirits.

Sanjay was then taken to the clinic of Dr. Barin Sarkar, a child specialist in Jamshedpur. Dr. Sarkar's small office is in the ground floor of a house that at night goes dark except for the light of the waiting room. There, mothers from the countryside hug their children and wait their turn, hoping to be seen before the office closes at 9:30 p.m.

Dr. Sarkar said in an interview he diagnosed Sanjay as having muscular dystrophy. The disease is genetic, inherited through relatives, though no one in Sanjay's family can recall anyone else suffering from it.

Partially Paralyzed

A village homeopathic doctor, Sudhir Nandi, said in an interview that Sanjay's sister, Sunita, was partially paralyzed by something "polio-like." He couldn't say what exactly killed her. Another local doctor, Hem Chandra Gope, said he examined a 13-year-old girl with similar symptoms and concluded she was taken down by polio. Dr. Gope said he'd seen "a few dozen" cases like hers in the area, and then changed the number to "maybe about 15."

A medical certificate for Rakesh Gope, prepared at one of the medical "camps" held regularly to evaluate locals en masse, classified his illness as cerebral palsy. A similar certificate for Kaliburi Gope said she had dorsolumbar kyphoscoliosis, a deformity of the spine.

In Potka, about 12 miles from Jadugora and the administrative seat of a block of more than 200 villages that include Sanjay's, Dr. Rani Kumari Beck splits her time seeing patients between two government health clinics. When reporters caught up with her during a Sunday shift in May, she said she was well aware of Jadugora's health woes. "Our observation – and it is just an observation – is as you move away from the mines the incidence of these diseases decreases," she said.

Rural Clinics

Dr. Beck's view is that the rural health facility isn't equipped to diagnose much less treat such cases. The physical condition of the clinic seemed to confirm that. A few patients lay on thin mattresses in dark rooms. Abandoned freezers sat rusting outside in front of a dilapidated former doctors' office occupied by a caretaker, its shutters crooked and chunks of concrete missing from its exterior wall.

Dr. Beck refers children with serious health issues to hospitals in bigger towns. Many families, poor and illiterate, can't afford that and are left to try to figure things out on their own, visiting a jumble of village holy men and local doctors.

Those who do have cash travel to doctors in Jamshedpur, the nearest actual city, where they collect diagnosis notes written in English, a language most of them can't read. They take the

sheets of doctors' stationery back home, stuff the paperwork into plastic bags or folders – and are nowhere closer to getting an answer than when they began.

Bags of Paperwork

Amitabh Kaushal sits in a modest air-conditioned office behind a large wooden desk, scrolling through his iPad. As deputy commissioner for East Singhbhum District, he is the area's ranking bureaucrat. He said he's heard that studies have been done in Jadugora – he's just never seen them.

"This is what I'm told, but I've yet to look at those reports," said Kaushal. He asked for the details of families Bloomberg reporters had interviewed and noted down their names. "In light of this thing, the information you have just provided, I think fresh studies again are called for – as to correlate whatever data was there earlier and whatever is there today," Kaushal said. "Such diseases in different families without a common linking factor do require a detailed, serious investigation."

Kaushal said that he would have more information in seven days but e-mails and phone calls to him in the weeks following were unreturned.

Company Doctor

A visit to Dr. A.K. Pal, another chief medical officer at Uranium Corp.'s Jadugora hospital, produced a similar reaction of puzzlement.

After hearing a description of Sanjay's and others' physical conditions, Dr. Pal, who has worked in the area since 1989, said, "I have been to a lot of villages and I will go to more villages for medical camps. I have not seen this."



Leda Karmokar sits next to the grave of his daughter, Lali, in the Bango village. Lali never had a chance, said Karmokar, a man whose weathered visage and missing teeth make plain his poverty. "She couldn't walk. She couldn't use her hands. She just crawled around."

He was speaking in a small surgery recovery room during his rounds, reading glasses perched on the end of his nose, a mobile phone holstered to his waist.

Not a single case?

"No," he said.

Sanjay Gope's family lives just four miles away. And down the road from them, Leda Karmokar, a field laborer lying in a dark, sweltering room without electricity, rises to show visitors to the jumble of rocks in the field that marks the grave of his 11-year-old-daughter, Lali, who died about two years ago. He stands at the grave site beneath an implacable sun on a scorching, windless day, a nearby palm tree pinned against the sky like a still life. Women across the road wash clothes in a pond. Cows graze and twitch at flies in the unrelenting heat.

Lali never had a chance, said Karmokar, a man whose weathered visage and missing teeth make plain his poverty. "She couldn't walk. She couldn't use her hands. She just crawled around."